



ALCOA ALUMINUM
FASTENERS
AND
SCREW MACHINE PRODUCTS



ALUMINUM COMPANY OF AMERICA

1949

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ALCOA ALUMINUM FASTENERS AND SCREW MACHINE PRODUCTS



1949

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PITTSBURGH 19, PA.

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Facilities

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Products

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Bolts and
Cap Screws

③

Nuts

④

Machine
Screws

⑤

Wood
Screws,
Lag Bolts

⑥

Sheet
Metal
Screws

⑦

Washers

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Rivets and
Nails

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Fasteners,
Accessories

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EDGEWATER, N. J. WORKS OF ALUMINUM COMPANY OF AMERICA

Situated on the west bank of the Hudson River, opposite New York City, this plant houses the modern facilities used in the manufacture of the Alcoa Aluminum Screw Machine Products and Fasteners described in this catalog.

INTRODUCTION

This is the first complete catalog of Alcoa standard fasteners and special screw machine and cold headed products. It has been designed as more than a mere catalog; as a reference book containing a wealth of factual information concerning these products and their use. We hope you will find it valuable and will refer to it whenever a question arises as to specifications, available types and sizes, etc.

This book covers two distinct but closely related lines: Standard Fasteners, and Special Cold Headed and Machined Products. We have attempted to give a very complete story on all types of standard fasteners, and feel that in these pages you will find the items required for most of your usual fastening problems. Our story on special products must, by its nature, be limited to a general description of our organization and facilities together with some examples of the types of work we have done.

Alcoa has for years been recognized as the major producer of the highest quality aluminum and aluminum alloy products in every commercial form. Attractive, strong, lightweight, corrosion resistant fastenings made by the same dependable organization are now available in a greater variety than ever before to enable you to make the most effective use of these materials.

This book has been double indexed to aid you in using it as a ready reference. A complete index will be found on page 249. In addition, each section is marked by a descriptive index tab, and each of these tabbed separators lists the contents of that particular section.

The designs of many of the parts made of Alcoa Aluminum and illustrated in this book are not the property of Aluminum Company of America. They are used herein for illustrative purposes only and must not be copied without the consent of the owners.

Facilities

1

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nails and
Nails

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SECTION

①

FACILITIES

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Cap Screws

③

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Screws

⑤

Wood
Screws,
Lag Bolts

⑥

Sheet
Metal
Screws

⑦

Washers

⑧

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Nails

⑨

Misc.
Fasteners,
Accessories

⑩

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FACILITIES...MEN AND MACHINES

There may be little apparent similarity between the wood screw and the "cork puller" assembly pictured here—except for their both being made of aluminum. They were, however, both produced by the same team of specialists skilled in the working and machining of all aluminum alloys into standard fasteners and special screw machine and cold headed products. The same years of experience and intimate knowledge of the characteristics of aluminum alloys, coupled with a complete range of manufacturing facilities, enabled production of both parts to the required quality standards at the lowest cost.

The use of aluminum alloys for screw machine and cold headed products was pioneered by Alcoa, as were many of the developments which have brought this metal into common use in such a brief period. The techniques which were developed during this pioneering period and have been constantly refined and improved, are available to the user of machined or cold headed products together with the experience gained in producing many thousands of different items to customers specifications.

We work only with the light metals—aluminum and magnesium—and our organization is thoroughly trained and experienced in handling these versatile materials in all alloys, tempers and forms. Whether you require the ruggedness and durability of a large aircraft fitting in a tough, strong, heat-treated alloy; or the ductility and electrical conductivity of a small plastic insert in soft commercially pure aluminum; your requirements are probably similar to those we have encountered before.

The few pages immediately following will give you a brief introduction to our plant and equipment. Our capacity for producing a complete line of standard fasteners is illustrated on pages 10 to 36 of this booklet. Our capacity for producing special parts machined or cold headed to your specifications including all types of secondary machining and finishing operations we will leave to your judgment after you have looked over the following pages with your own particular requirements in mind. May we have the privilege of quoting on your needs for this type of work in aluminum and magnesium? Send your prints and specifications to the nearest Alcoa Sales Office listed at the end of this book, or ask for a representative to call and discuss your needs and our ability to fill them satisfactorily.



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nails and
Nails

9

Misc.
Fasteners,
Accessories

10

Design
Information
Tables

11

SCREW MACHINES

Suitable equipment and well trained operators are necessary if the cost saving potentialities and attractive appearance of aluminum and magnesium alloy machined parts are to be fully exploited. Our equipment has all been selected for the single purpose of machining aluminum and magnesium as well and as economically as possible. It consists of a variety of modern, precision, high speed screw machines capable of handling all types of rod, bar, and tubing work up to 3-1/2 inches outside diameter. This equipment ranges from hand screw machines for short runs to single and multiple spindle automatics for the most economical production of medium and large quantity items.

The skill and knowledge of its setup men and operators constitute a most important item of "stock in trade" for any organization in the business of manufacturing screw machine products. In order to preserve and augment its supply of "know how" in this field, Alcoa conducts an extensive apprentice training program for developing operators and setup men. These men are trained not only in the operation of screw machines, but specifically in the operation of screw machines to most efficiently machine aluminum and magnesium alloys.



LINE OF DAVENPORT AUTOMATIC SCREW MACHINES

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nails and
Nails

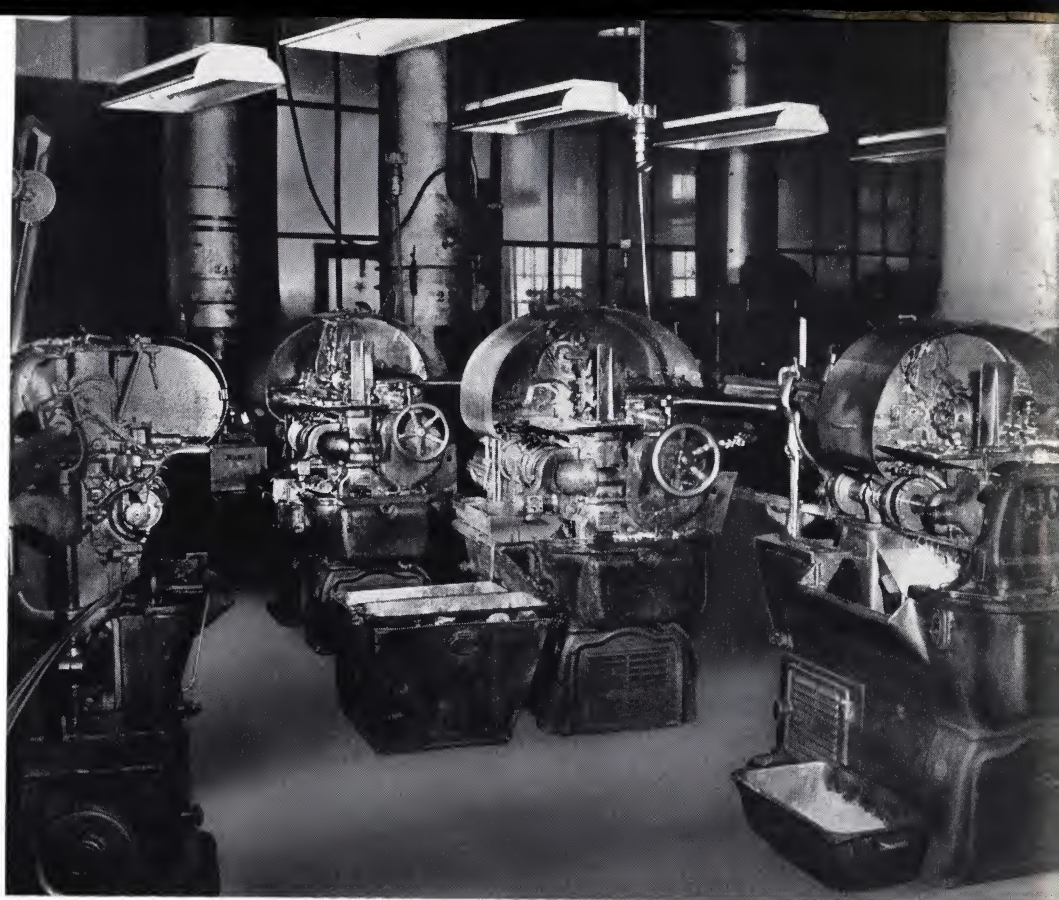
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Misc.
Fasteners,
Accessories

10

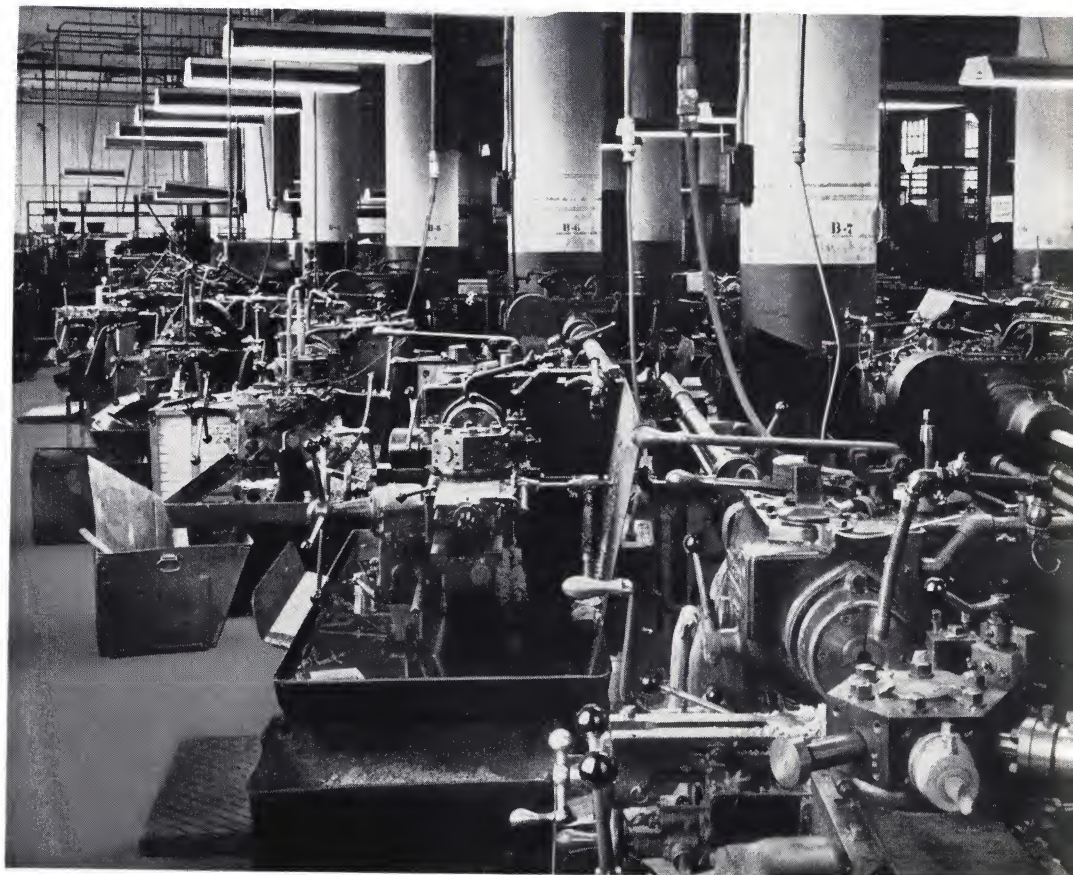
Design
Information
Tables

11



BROWN AND SHARPE AUTOMATIC SCREW MACHINES

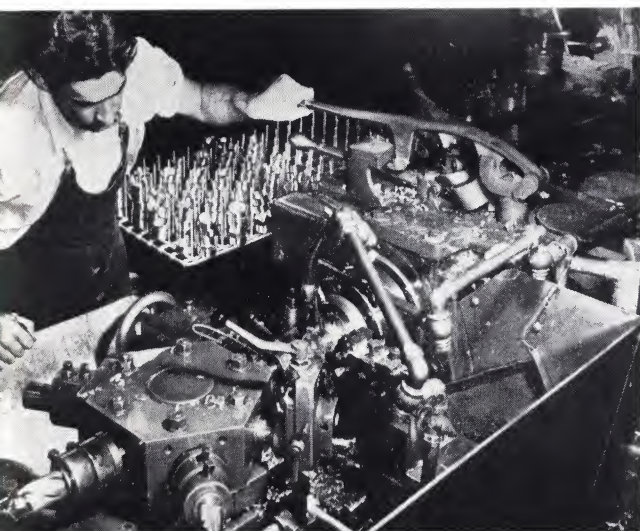
LINE OF HAND SCREW MACHINES



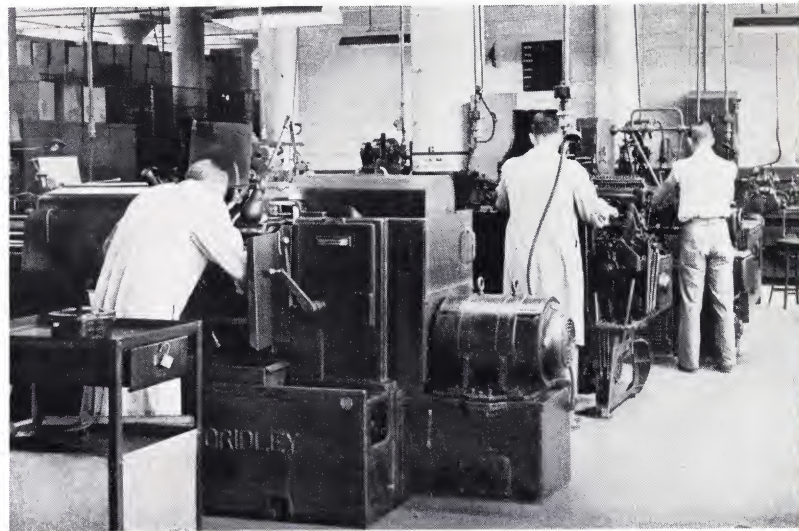


LARGE MULTIPLE SPINDLE SCREW MACHINE

MACHINING AIRCRAFT PARTS ON A
HAND SCREW MACHINE



OPERATING PRODUCTION MACHINES IN
THE APPRENTICE TRAINING SHOP



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

ets and
Nails

9

Risc.
teners,
essories

10

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COLD HEADING EQUIPMENT

Automatic cold heading equipment for upsetting parts from coiled wire is used primarily for the manufacture of rivets. The use of such machines is by no means limited to the production of rivets however, since a variety of screw and bolt blanks as well as special parts can also be made by this method. Parts so produced have high strength, can be held to accurate dimensions, and are usually far more economical than the same part produced by any other method.

Such parts must, of course, be properly designed for production as upset-head items, but progress in the cold heading of aluminum has advanced to the point where many parts which formerly had to be made by more expensive methods can now be upset with minor variations or changes in design. Frequently, special fasteners or similar parts can be produced economically by a sequence of operations starting with upsetting a blank, followed by automatic slotting, trimming, flattening, thread rolling etc. Users of such parts would do well to question an Alcoa representative as to the possibility of producing their parts or modifications thereof by this method.

Alcoa operates a large and completely equipped upset products department for the manufacture of rivets, nails, bolt and screw blanks, and special parts. Headers are of the closed or solid die type and range in capacity from 1/16" to 3/4" wire size, and in lengths up to approximately 5 inches. Both single and double stroke machines are available as well as special headers for tubular rivets, split rivets, and nails. Headers are of modern design operating at high speed with resulting low costs.

Wire drawing equipment is maintained to permit drawing wire to specified size to meet rush delivery dates when wire is not on hand or available from the mill within the required time.

Facilities are available for heat treating, annealing, and aging all types of aluminum alloys, permitting production of upset products in a variety of tempers. A battery of tumbling barrels in which all upset products are tumbled to clean and remove flash completes the assortment of equipment devoted to this type of work.



REMOVING RIVETS FROM HEAT TREATING FURNACE FOR QUENCHING

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nails and
Nails

9

Misc.
Fittings,
Accessories

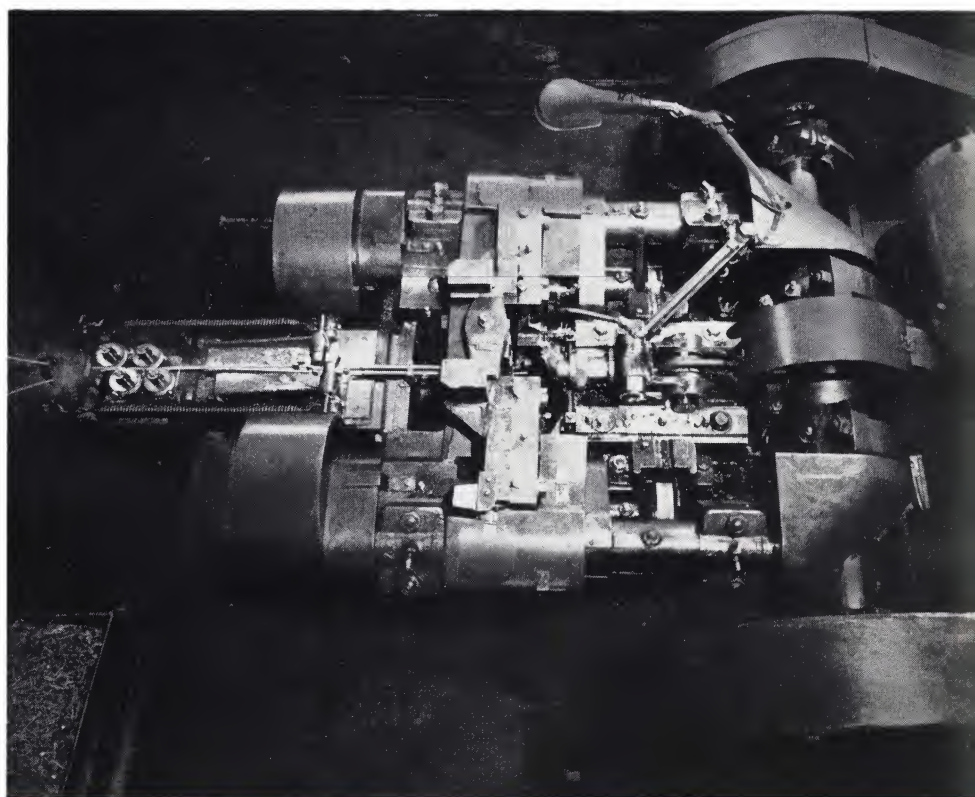
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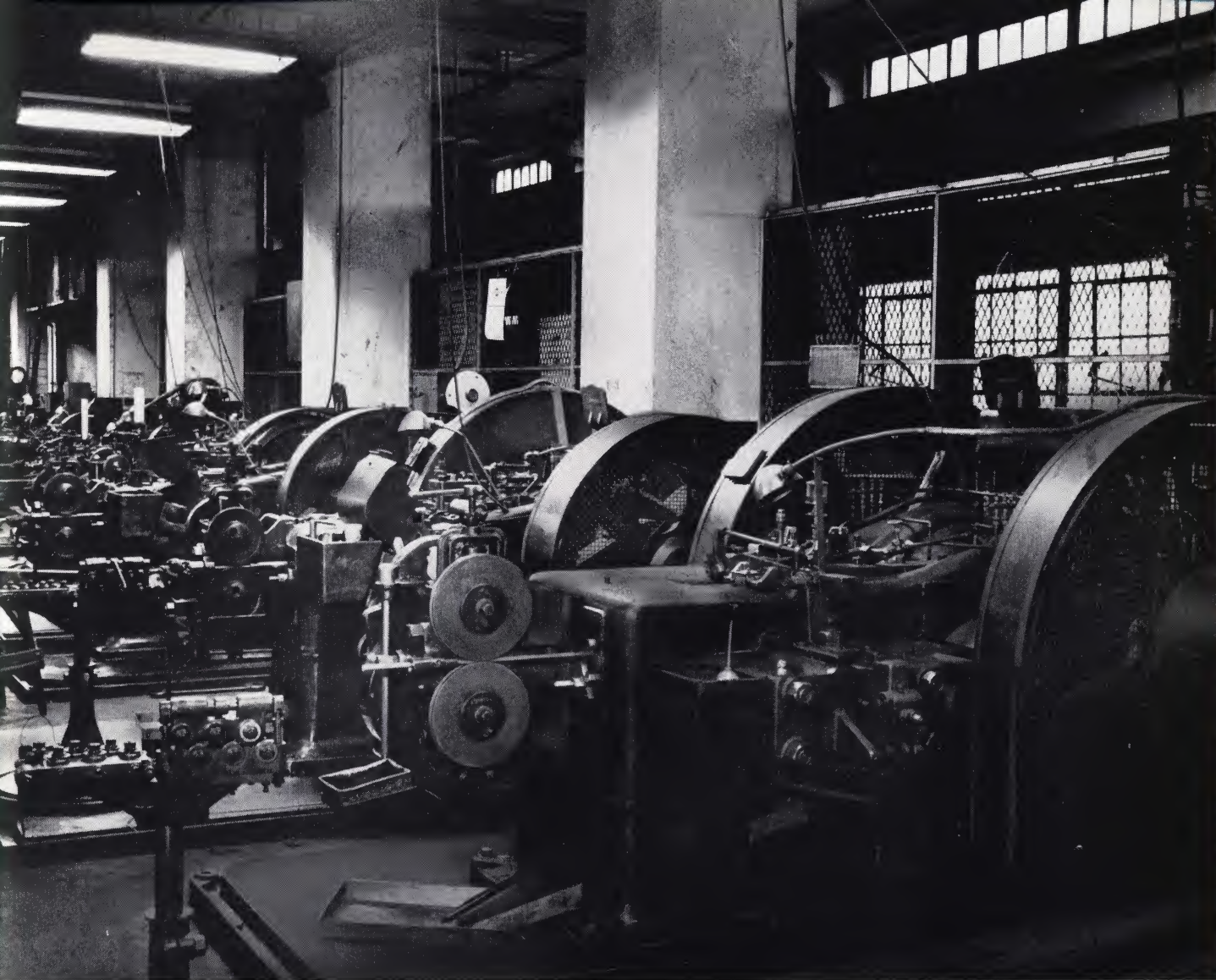
Ignition
Systems



LINE OF SMALL RIVET HEADERS

DOUBLE STROKE
NAIL HEADER





LARGE DOUBLE STROKE COLD HEADING MACHINES



TUMBLING BARRELS
FOR CLEANING AND
DE-BURRING RIVETS

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

ets and
Nails

9

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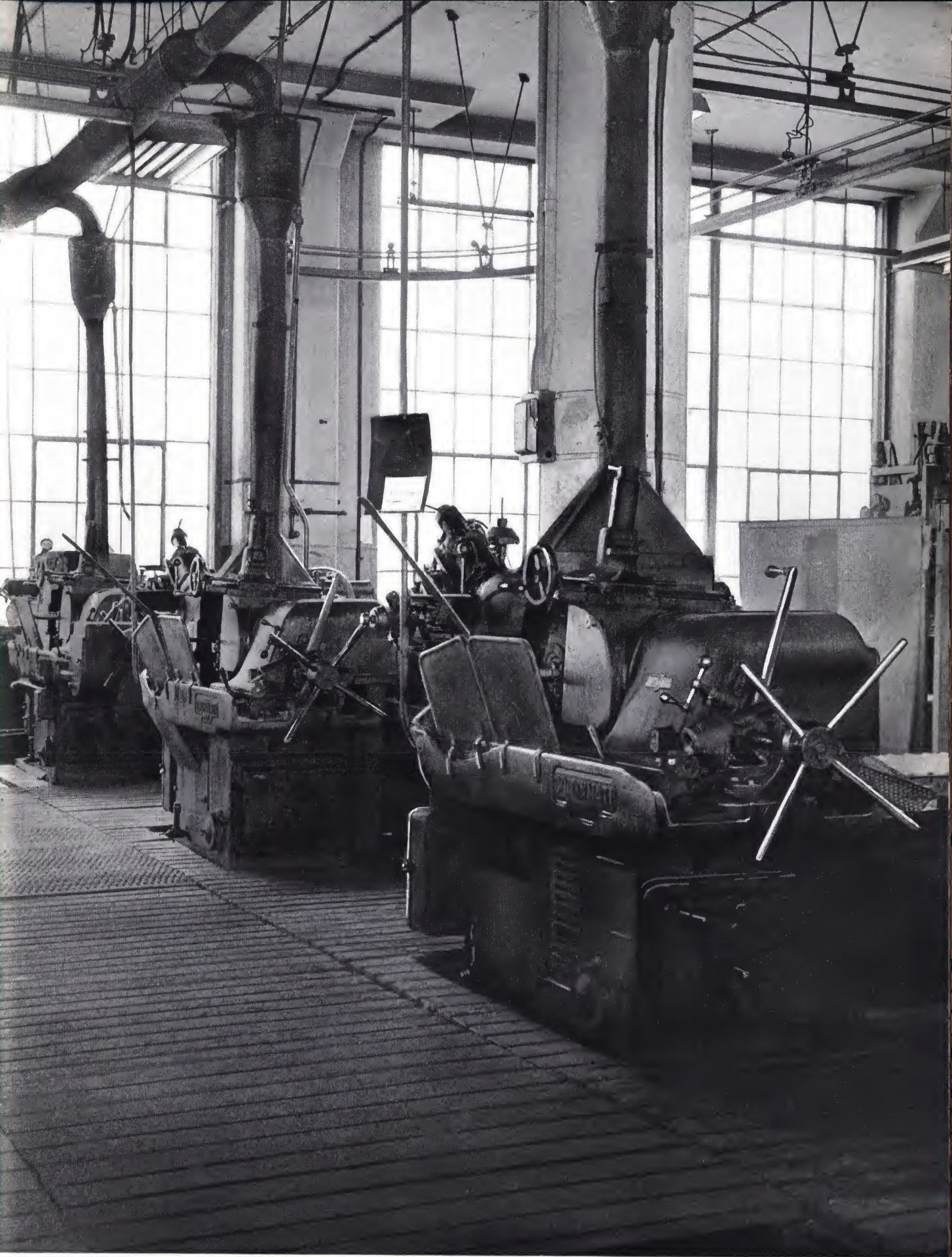
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SECONDARY OPERATIONS

Some parts can be made complete in one operation on an automatic screw machine or rivet header, but often one or more additional operations known in the trade as "secondary" operations must be performed in order to complete the part in its final form. Frequently such secondary operations receive secondary consideration. The error of this approach is evident when it is realized that most primary operations are fully automatic, resulting in high production and low cost, while, because of their nature, many secondary operations are semi-automatic or manually controlled. With this situation existing it is possible for the cost of secondary operations to exceed that of the primary operation and thus give a wrong impression of screw machine costs.

Alcoa has available a wide variety of secondary equipment for performing such operations as drilling, tapping, milling, slotting, press forming, stamping or marking, thread rolling, and many others. Like our primary equipment, the machines for this work were selected to process aluminum alloys in such a way as to take maximum advantage of the potential economies of the material. Dial and hopper feeds can frequently be used on parts of a semi-standard type, and magazine feeds have been developed and successfully used on special parts where production quantities have warranted.



CENTERLESS GRINDERS

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

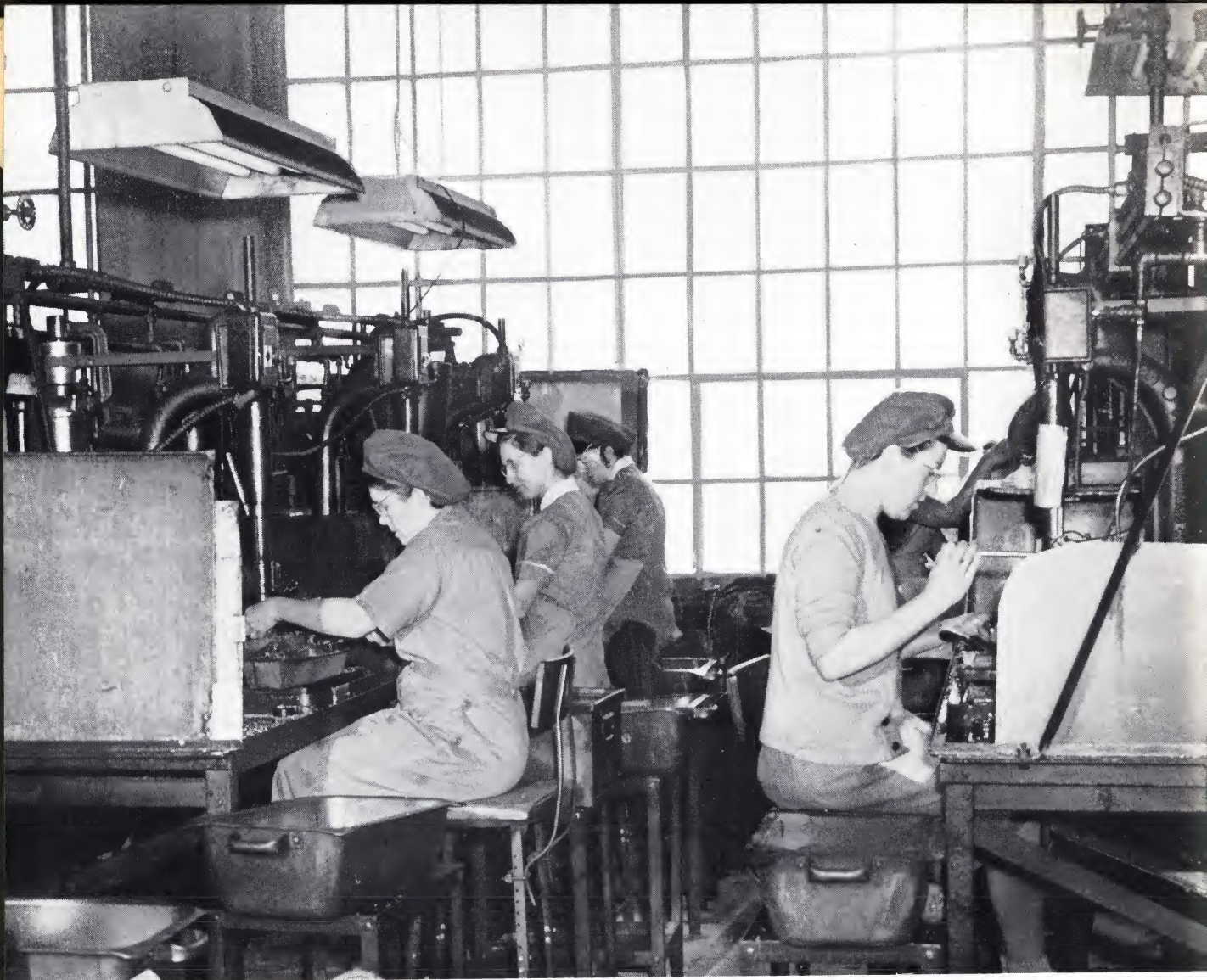
Nails and
Screws

9

Misc.
Fasteners,
Accessories

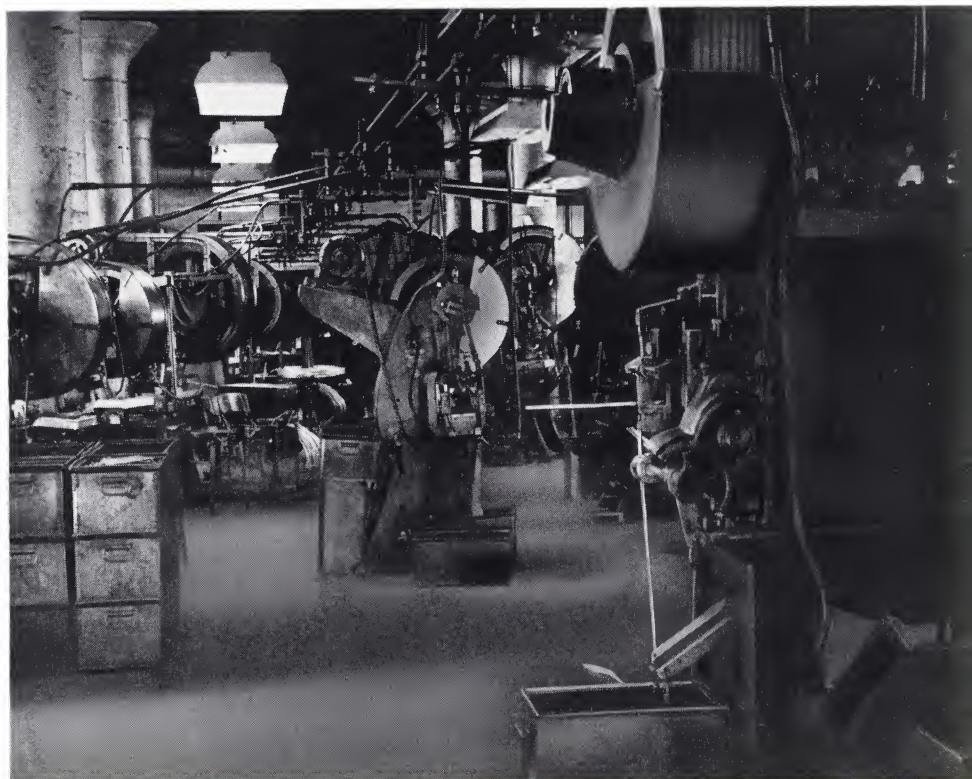
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Other
Fasteners
and
Accessories



GIRLS PERFORMING LIGHT DRILL PRESS OPERATIONS

SECTION OF POWER
PRESS DEPARTMENT





AUTOMATIC SLOTTING AND THREAD ROLLING EQUIPMENT

CLOSEUP OF DRILLING OPERATION



WOOD SCREW POINTING AND THREADING MACHINES



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nets and
Nails

9

Misc.
Cleaners,
Accessories

10

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FINISHING

Aluminum parts as machined offer a clean, bright and attractive appearance which accounts in a large measure for the popularity of this material for screw machine work. There is no need, however, to stop at this point if pleasing appearance is a particular requirement for the part under consideration. The more popular methods of surface finishing which are applicable to screw machine and upset products are described in detail on pages 211 to 212. Alcoa has developed and refined many of these finishing processes for use on small aluminum parts, and maintains the equipment and skilled personnel required to furnish any of the surface finish treatments described.

A variety of tumbling and burnishing barrels handle thousands of pounds of screws, bolts, nuts, washers, and small special parts each week. A range of barrel sizes and an assortment of different size and shape burnishing materials permit economical handling of small and large lots and most effective finishing of many shapes and sizes.

Several series of chemical tanks, rinse tanks, and drying tables or ovens are available for processing parts through the various chemical finishing operations. Provision is made for handling parts either in bulk lots in baskets or trays or individually racked as required. In addition to producing parts with a final frosted finish, these chemical treatments are frequently used as an intermediate or preparatory step in a series of mechanical finishing operations. In such cases, they improve the quality of the resulting finish while reducing the cost of subsequent operations such as oiling or buffing.

A line of variable speed polishing lathes are used for oiling, buffing, color buffing and similar operations. Polishing wheels of several types and a variety of compounds and abrasives when used in conjunction with this equipment, permit the processing of parts through all wheel type grinding and polishing operations. For aluminum, as for most other materials, there is usually one best sequence of polishing operations to produce the desired finish at minimum cost. As a result of years of experience with this type of work, Alcoa is in a position to set up the proper operations for all types of work.

In addition to complete facilities for applying the usual mechanical finishes to aluminum screw machine and upset products, Alcoa maintains an entire department devoted to the process of applying Alcoa Alumilite finishes to parts of this type. Large, fragile, or highly finished parts are individually clamped on standard or special racks for processing, while bulk packing in cylinders is used for economical processing of smaller parts which will stand this type of handling without damage. A series of dye tanks permits application of colored Alumilite finishes, for decorative effect as well as the usual purely protective Alumilite coatings.

A laboratory is operated as an integral part of the finishes department to insure the required control of solutions and operating procedures which results in a high quality uniform Alumilite coating. The development of dye combinations and processing procedures for producing special color work is also an important part of the laboratory work. All work is periodically checked for coating thickness, and is visually inspected after application of the Alumilite finish.



LOADING CYLINDER OF WORK INTO TANK FOR APPLYING ALUMILITE FINISH IN BULK

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nails
and
Nails

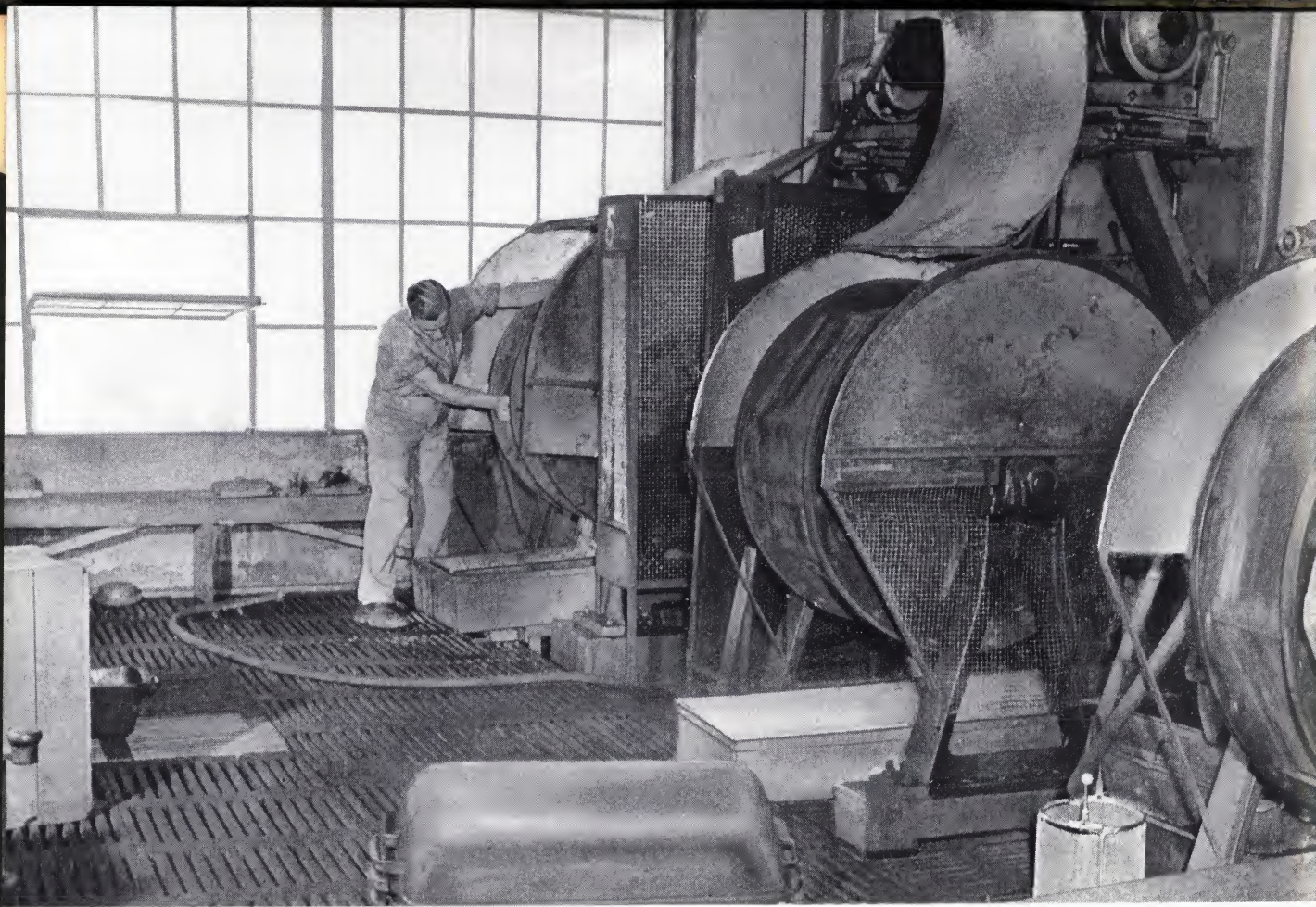
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Misc.
Fasteners,
Accessories

10

Other
Fasteners
and
Accessories

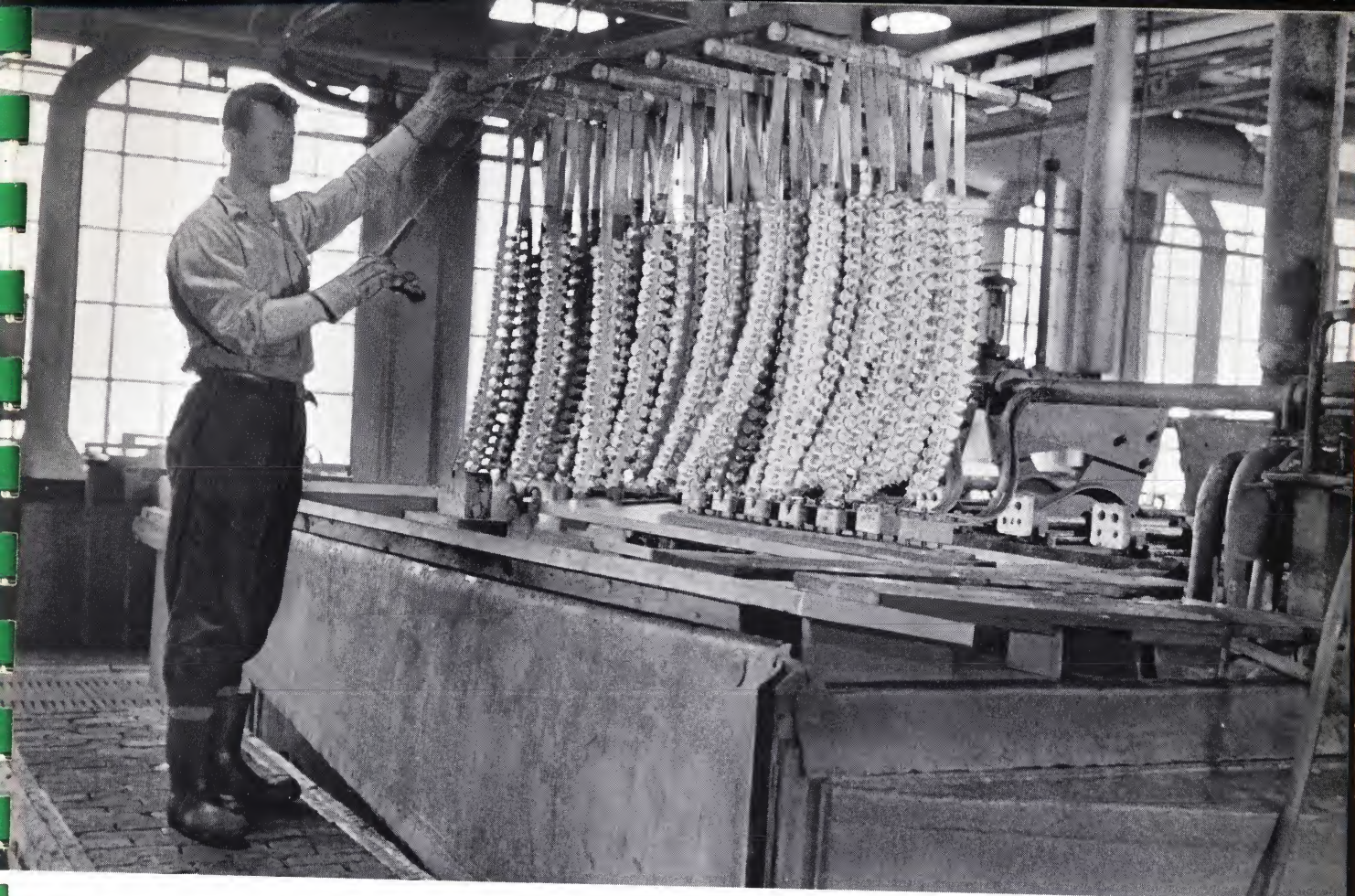
11



TUMBLING BARRELS USED FOR BALL BURNISHING

POLISHING
LATHES





LOADING RACKED WORK INTO TANK FOR ALUMILITE TREATMENT

Below Left—EQUIPMENT FOR
PRODUCING CHEMICAL FINISHES

Below Right—SECTION OF LABORATORY FOR THE DEVELOP-
MENT AND CONTROL OF ALUMILITE FINISHING OPERATIONS



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

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Nails

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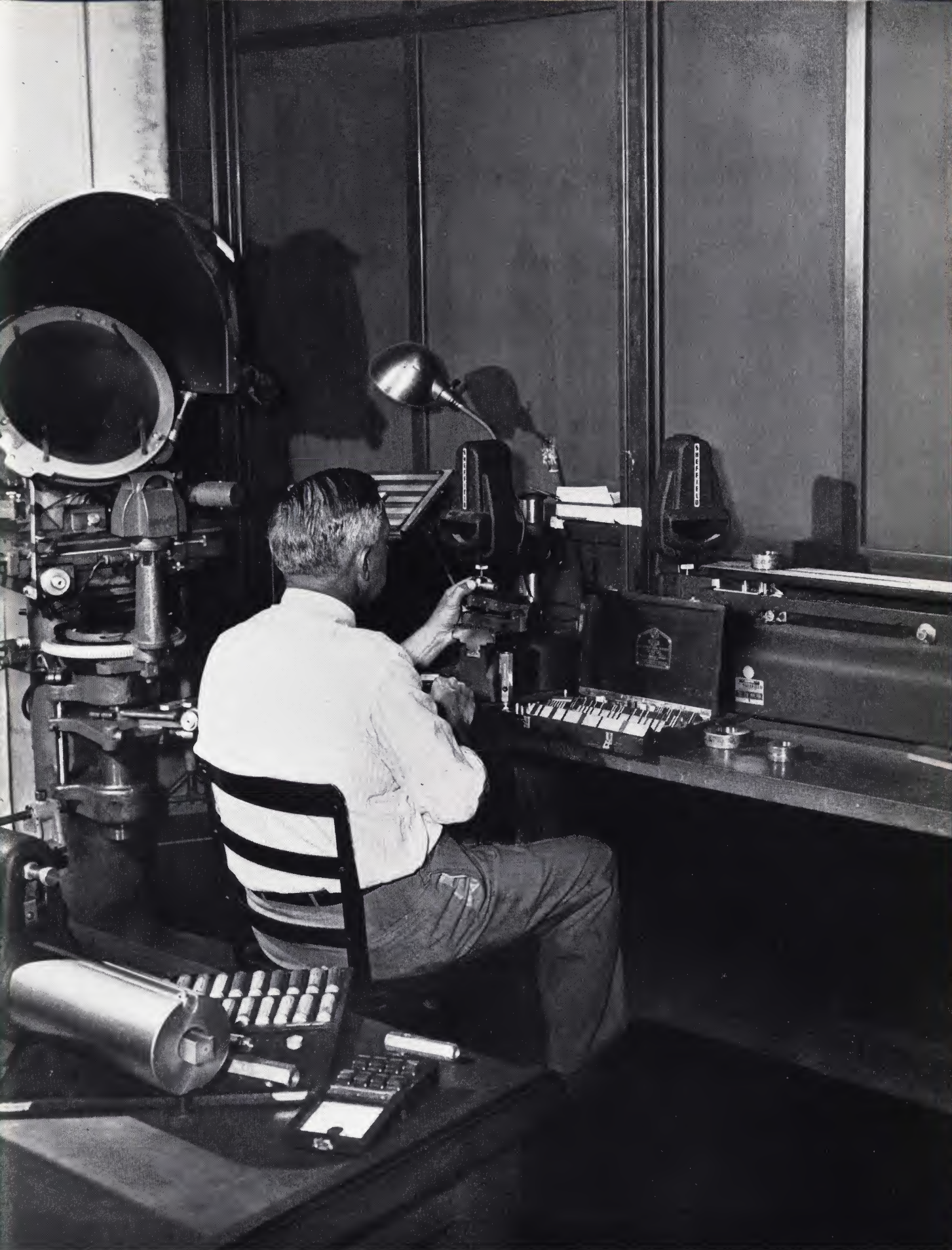
QUALITY CONTROL

Control over the quality of Alcoa's screw machine and upset products starts with the man at the machine. Regardless of how complicated or how simple his operation may be, he is supplied with the proper tools and equipment to produce a quality part and the necessary gages to check this part against established quality standards.

Important items in Alcoa's quality control program are the inspection of the tools which will be used to make the part and the checking and setting of gages which will be used to measure the part. This work is performed under the direct supervision of the chief inspector in an instrument room which is equipped with every necessary modern precision measuring instrument.

As each operation is set up and ready to run, the first parts off the machine are subjected to a rigid inspection by the first piece inspector. In addition to approving the parts for production this inspector interprets for the operator any special quality requirements and cautions him concerning features which should receive special care.

The product is subject to the usual process and final inspections where the latest statistical methods of quality control are applied to the sampling procedure whenever possible. These inspections serve as a double check on quality, but the primary responsibility for the production of good work rests always with the man at the machine.



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Rivets and
Nails

9

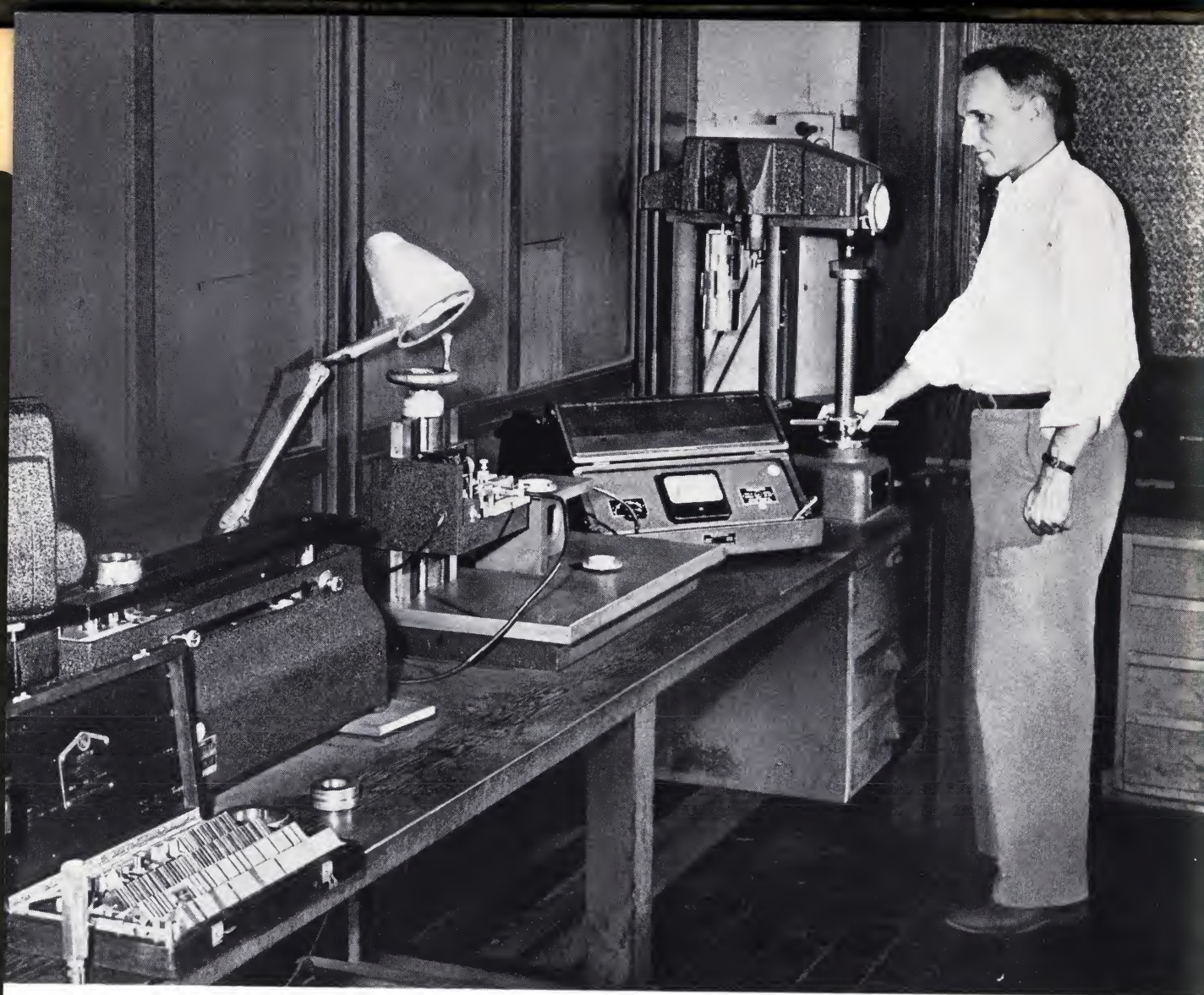
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CHECKING A TAPER PLUG GAGE BY THE USE OF A SINE BAR AND GAGE BLOCKS



TOOL HARDNESS BEING CHECKED ON HARDNESS TESTER

MEASURING SURFACE
ROUGHNESS BY MEANS
OF THE PROFILOMETER





VISUAL INSPECTION OF ALUMILITE COATING ON RIVETS

PROCESS INSPECTION OF PARTS
FROM THE SCREW MACHINE



FORM TOOL CONTOUR BEING
CHECKED ON OPTICAL COMPARATOR



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

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Washers

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TOOL AND GAGE MAKING FACILITIES

The production of thousands of special screw machine and upset parts to customers specifications requires a large inventory of special tools and the ability to repair, rebuild, or make new tools on short notice. To fulfill this requirement, Alcoa operates its own tool room in which nearly all of its special tools are manufactured. Modern high speed precision equipment insures accurate tools at low cost. Tool-makers are experienced in the needs of this particular type of business and are familiar with the production machines in which the tools will be used.

Most important, the toolmaking facilities and personnel are devoted solely to the manufacturing of tools for producing aluminum and magnesium products. Tool design and toolbuilding practice are concentrated on the single objective of machining or upsetting these materials to the required tolerances and finish at the highest possible speed and consequently at the lowest possible cost.

In addition to tools, Alcoa produces its own cams for use on automatic screw machines as well as gages for checking the dimensional accuracy of all types of products. This integrated setup gives close control of quality, cost, and delivery as all of the factors affecting these items are under one organization.



Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Rivets and
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SECTION OF THE TOOLROOM

RAW MATERIAL STOCKS

Service to customers in the matter of prompt deliveries requires, in addition to proper equipment and a trained organization, an immediately available supply of raw material. Due to the nature of a jobbing business which stands ready to produce thousands of types of screw machine and upset products to customers designs and specifications it is impossible to keep a stock of all the hundreds of types and sizes of material which may be needed. As the result of years of experience, however, it has been possible to determine what materials are most commonly used and to establish stocks of certain standard alloys, types, and sizes which will permit the manufacture, at least of initial shipments, of the majority of special items.

Normal stocks include a variety of sizes of rivet wire in 2S, 17S, A17S, 24S, and 53S alloys; round and hexagonal screw machine stock in 11S-T3 and 24S-T4 alloys, and coiled sheet for blanked washers in 2S-H18 and Alclad 24S-T4. Certain special alloys and sizes of rod, bar, and tubing are stocked for special products which are ordered repeatedly in large enough quantities to warrant the maintenance of stocks. In addition to stock for special customers parts, a complete stock of material is maintained for the production of standard fasteners.



Top—PORTION OF RIVET WIRE STOCK

Bottom—SECTION OF SCREW MACHINE ROD STOCKROOM

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
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STANDARD FASTENER STOCKS

In order to facilitate prompt shipment of orders for standard fasteners, Alcoa maintains in stock thousands of types and sizes of such items available for immediate delivery subject to prior sale. Stocks include the more popular sizes of machine screws, wood screws, sheet metal screws, bolts, nuts, washers, and similar parts. Those types and sizes normally kept in stock have been so indicated on each page of the standard fastener section of this catalog.

Alcoa's normal stocks are sufficiently large to take care of the immediate needs of most customers, and even where very large quantities are required additional material can be fabricated on short notice to supplement material on hand.

In addition to the mill stocks maintained by Alcoa, there are available to users of standard fasteners the stocks of popular items maintained by the Alcoa distributors listed at the end of this catalog. Small orders should be placed directly with distributors for lowest price and prompt handling.



STANDARD FASTENER STOCK

Special
Products

2

Bolts and
Cap Screws

3

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

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Washers

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Rivets and
Nails

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BOXING FASTENERS

ALUMINUM FASTENERS ON THE SHIPPING LINE



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Special
Products

②

Bolts and
Cap Screws

③

Nuts

④

Machine
Screws

⑤

Wood
Screws,
Lag Bolts

⑥

Sheet
Metal
Screws

⑦

Washers

⑧

Nails and
Nails

⑨

Misc.
Fasteners,
Accessories

⑩

Sign
Material
Tables

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SPECIAL PRODUCTS

The term "special product" is used in this catalog to distinguish a part made to a particular customer's design and specifications from a common item made to generally accepted industry-wide specifications and used by a large number of customers. The range and versatility of automatic screw machines, cold headers, and related secondary equipment is such that literally thousands of different parts of this type are produced by Alcoa each year in aluminum and magnesium alloys. An order for a special product placed with Alcoa appropriates for the customer's use a portion of the efforts of a broad, highly experienced organization. The part is analyzed by our engineers and where advisable changes in design are suggested to lower manufacturing cost or to improve the quality of the product. Manufacturing methods and facilities are examined to determine the most economical way to produce the part to required quality standards. Special tools and gages are built to facilitate production and inspection. Necessary machine capacity is reserved and raw material is allocated from stock or procured from the mills to meet promised delivery dates. When the job is set up and running, each operator is working for the customer until his operation is satisfactorily completed, and each inspector serves as the customer's representative in double checking the product for conformity to the customer's specifications.

SMOKING PIPE ACCESSORIES

Aluminum, because of its pleasing, bright appearance, lightness, and resistance to corrosion, has long been the favorite material for all types of metal parts used in smoking pipe assemblies. The great bulk of such parts are produced as screw machine products. Alcoa was a pioneer in the machining of aluminum for this use and has over the years produced literally thousands of different types and styles of smoking pipe accessories, a few of which are illustrated in the accompanying photograph.

Parts have been machined from round rod, hex or square bar, tubing, and special extruded shapes. A few parts have been produced as cold headed products with added secondary operations while certain round and oval washers have been blanked from sheet. Bright (ball burnished) finish has been the most popular for these parts and is particularly effective on items of this general size and type. Some items have been supplied with a caustic etch finish and a few have been buffed and color-Alumilited. 11S-T3 alloy has been used almost exclusively for those parts machined from round rod, while most parts made from tubing or special extruded shapes have been produced from 61S-T6 material.

Some of the more common types of pipe parts which we have manufactured are listed below:

- Extensions or Cleaners
- Bowl Shank Insert Bushings
- Stem Insert Tonnons
- Tubular Filter Holder Insert Tonnons
- Washers
- Bands



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AIRCRAFT PARTS

The lightness and strength of aluminum and magnesium alloys have made possible the modern high performance, military and commercial aircraft. The airplane of today consists primarily of aluminum, including thousands of screw machine and upset products per plane. The bulk of these parts are of course, standard fasteners such as rivets, bolts, nuts, and screws. Others such as pipe, tube, and hose fittings, special fasteners, and machined castings and forgings are pictured separately. There are, however, many aluminum upset or machined parts used in frames, engine, landing gear, and auxiliary equipment which are not included in these general classifications. A few of the many miscellaneous aircraft parts recently produced by Alcoa are pictured here. They range from clevis rods to carburetor parts and from oil filter cases to rigid conduit couplings. Such parts have been manufactured to exacting tolerances in sizes up to 3-1/2 inches in diameter. Many items have been produced to Army-Navy Aircraft specifications, and Alcoa is in a position to furnish to customers order most of the standardized Army-Navy Aircraft parts which are suitable for manufacture by screw machine or upset methods.

Manufacturers' and government specifications call for protective anodizing of many aluminum aircraft parts. Alcoa Alumilite finishes are available which fulfill rigid government specifications. When you order aircraft parts from Alcoa, the Alumilite finish can be specified and will be supplied without the necessity of sending the parts to another contractor for this finishing operation.

PIPE, TUBE AND HOSE FITTINGS

Wartime use of aluminum for oil, gas, and hydraulic pressure lines in military aircraft greatly accelerated the use of aluminum screw machine parts for pipe, tube, and hose fittings. Light weight, high strength, and freedom from corrosive attack—which could be further enhanced by the Alumilite treatment—were the properties which brought aluminum into prominence for these uses. These same properties explain its growing popularity in peacetime for fittings ranging from soup kettle outlets to garden hose nozzles.

Alcoa's experience in the production of fittings includes all of the standard nuts, couplings, and unions as well as a wide variety of such parts made to Army-Navy Aircraft specifications. Hose couplings have been produced in a wide range of types and sizes for both aircraft and commercial motor truck applications. Although pipe, tube, and hose fitting design has been standardized to a considerable extent, the manufacture of special type fittings to customers' specifications for particular applications constitutes an important part of Alcoa's aluminum fitting business. Special connectors for hydraulic system controls, filter connectors, and tank welding flanges are but a few of the many special items successfully produced by Alcoa for many of the foremost companies in this type of business. Does the accompanying illustration suggest an instance in which Alcoa could supply your fitting requirements?



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PLASTICS INSERTS

Aluminum is rapidly displacing other metals as a material for inserts to be used in molded plastic parts. Perhaps the biggest point in favor of this use of aluminum is its coefficient of expansion which is close to that of the common molding materials. As a result, the two materials shrink equally as they cool, preventing stresses and cracks and reducing rejects.

High electrical conductivity is a property of aluminum of interest to users of metal inserts in molded parts for use in electrical equipment. The strength of aluminum inserts is also of importance in these and many other applications.

The light weight and clean, bright appearance of aluminum inserts are important features since they complement the similar characteristics of the plastic itself. Resistance to corrosion and chemical attack is of value where inserts will be exposed to the weather or used in process industries.

The advantages of aluminum inserts would appear sufficient to demand a premium in higher costs, but such is usually not the case. A pound of aluminum makes three times the number of inserts that can be made from a pound of the heavier metals, hence even though the cost per pound of rod may be more, the cost of material per thousand inserts is usually considerably less when they are made of Alcoa Aluminum.

Alcoa has produced many types and sizes of inserts, a few of which are pictured here. They are machined to the same high quality standards which distinguish all Alcoa screw machine products. Occasionally an insert design lends itself to manufacture by the upsetting method in which case the purchaser benefits by even greater economies. Call your nearest Alcoa representative and discuss your insert problem with him. He can probably show you how Alcoa Aluminum inserts can make aluminum-plastic teamwork pay off.



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CIGARETTE HOLDERS

Aluminum's lightness, pleasing appearance, and freedom from corrosion have made it by far the most popular material for cigarette holders. Alcoa has produced many of these parts in a variety of types, styles, and sizes. A few of the more popular items are pictured here. Because appearance is of prime importance in an item of this type the majority of the parts have been supplied with a buffed or color-buffed finish. Most parts have been given the Alumilite treatment for added protection and to preserve the finish against handling marks, scratches, and stains. In many cases colored Alumilite finishes have been chosen to impart a distinctive appearance.

In addition to manufacturing the component parts, assembling, and testing these items, Alcoa has in many instances taken an active part in the design of the item with a view to arriving at a design which would have maximum utility and sales appeal and at the same time permit economical manufacture.



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CIGARETTE HOLDERS

SPECIAL FASTENERS

It is expected that the assortment of Standard Fasteners listed in this catalog will fill the great majority of requirements for aluminum fasteners. The use of Special Fasteners in most cases constitutes unnecessary added expense and delay in delivery without adding to the quality or utility of the product.

There are, however, at least two situations which justify the manufacture of special purpose fasteners to customers' specifications. The first is a product design which cannot be modified to use a standard fastener and for which a special purpose fastener must be manufactured regardless of increased cost. The second is a manufacturing program of large proportions requiring extremely large quantities of a special purpose fastener which offers some advantage over a standard. In this latter case the quantity involved may be so great that the delay and additional cost for tooling are considered justified.

Alcoa has for many years manufactured special purpose aluminum fasteners and has cooperated with customers in developing and modifying such parts to permit manufacturing economies as well as maximum utility. The parts illustrated show a few of the many special fasteners we have made to customers' specifications. With modern equipment for machining from rod or bar, cold heading, or blanking from sheet and a complete assortment of secondary operation on machines, we are in a position to manufacture special aluminum fasteners in a wide range of types, sizes, alloys, and finishes. The added protection of Alumilite finishes is available on all special fasteners if required.

SPECIAL COLD HEADED PRODUCTS

Standard upset fasteners and special upset blanks which are further fabricated by Alcoa are discussed and illustrated elsewhere in this booklet. Pictured here are a few special upset items made complete to customers specifications on cold heading machines. In some cases, these parts may be further fabricated by the purchaser while in others, they are in the final form required for ultimate use.

The economies offered by cold heading over other common manufacturing methods are so substantial that the possibility of designing components for fabrication by this process should not be overlooked by any organization purchasing such parts in large volume. The characteristics and limitations of upset product design are too numerous and complicated to enumerate here, but the items pictured may serve to suggest some part which you are now purchasing made by another method which might be developed as an Alcoa cold headed product.



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SPECIAL COLD HEADED PRODUCTS

MISCELLANEOUS SCREW MACHINE PARTS

While a large part of Alcoa's screw machine production can be classified in a particular category, as has been done on the preceding pages, the majority of parts are tailor-made for a specific use and come only under the broad classification of general screw machine work. The versatility of automatic screw machines and allied secondary equipment are such that there is practically no limit to the field of application of screw machine parts. It is impossible in this catalog to show more than a few typical examples of this type of work produced by Alcoa; the few examples illustrated will however give some idea of the variety of such work which has been successfully handled in the past.

Alcoa's service to its customers is not limited to producing single screw machine parts with required secondary operations. Various finishing operations are also performed to customers requirements and plain or colored Alumilite coatings furnished. Items are often shipped as partial or complete assemblies of several aluminum parts and it is not at all unusual for Alcoa to ship to a customer completely assembled articles (consisting of aluminum and non-aluminum parts) boxed in individual shipping or display cartons ready for immediate resale to consumers.

A few of the more easily identified products which Alcoa has manufactured are listed below.

Fountain Brush or Marking	Brush Handle Ferrules
Brush Parts	Musical Instrument Fittings
Automatic Pencil Parts	Lighting Fixture Connectors
Ball Point Pen Parts	Camera Parts
Hair Curlers for Permanent	Miniature Flashlight Parts
Wave Machines	Radio and Electrical Equipment
Picnic Jug Faucets	Parts
Ordnance Fuse Parts	Knobs and Handles
	Fishing Reel Parts

MACHINED IMPACT EXTRUSIONS, FORGINGS AND CASTINGS

Alcoa's hand screw machine, turret lathe, and other secondary operation facilities are frequently used for machining relatively small Alcoa forgings, impact extrusions and sand, permanent-mold or die castings. Customers requiring parts fabricated by these methods find it an advantage to deal with Alcoa as a single source for the finished part in preference to handling multiple contracts with, for instance, a foundry, a machine shop, and a polishing and anodizing shop. They get centralized responsibility plus the benefit of Alcoa thoroughness and dependability at every step in the manufacture of the product without the trouble and expense of coordinating and expediting their work between the various operations.

A few of the Alcoa castings, forgings, and impact extrusions which we have machined are shown in the accompanying illustration. Although not shown in the picture, some such parts in addition to being machined, have been polished or Alumilited before shipment.



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ASSEMBLIES AND SUB-ASSEMBLIES

In addition to supplying standard fasteners and special screw machine and cold headed products, Alcoa is a source of supply for small assemblies and sub-assemblies. This service has been found of special value to customers who wish to market a completed article but have no facilities to perform the assembly operations and to those who find that their own facilities can be more profitably employed for other work. The problem of contracting with a number of parts suppliers and the necessity for continual follow-up and check on quality and delivery on a variety of parts are naturally eliminated when the completely assembled article is purchased from Alcoa.

Assemblies which we have produced have been composed principally of aluminum alloy parts although certain articles contained other metallic and non-metallic components which were purchased by us. Precision grinding and machining equipment permits production of mating parts to accurate fits where required. Many parts have been polished and Alumilited before assembly and some have been buffed or otherwise finished after assembly. The complications involved in receiving unfinished parts from several suppliers and having some of these finished before assembly and some after illustrates another reason why many of our customers find it convenient and economical to order the completed assembly from Alcoa. Here all of the work is done under one roof with a centralized responsibility. We ship you a completed article finished to your own specifications and packaged for display if required; your product is delivered on time and at a fixed price.

A typical example of an Alcoa assembly is pictured in the accompanying photograph. The main components of the assembly are special aluminum screw machine products, but several standard stock fasteners have been used as well as several parts made from other materials. All of the aluminum parts are given a plain Alumilite finish before assembly. The lack of space prohibits the illustration of many other interesting assemblies produced by Alcoa, but these have taken many forms and have consisted of standard and special parts of all types and sizes within the capacity of our production equipment as outlined previously.



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BOLTS AND CAP SCREWS

Alcoa bolts and cap screws are made to American Standards Association and Army-Navy Aircraft specifications and are interchangeable with similar fasteners made of other metals. Their strength, light weight, and resistance to corrosion make them the preferred fasteners for many applications.

Aircraft bolts are produced to Army-Navy Aircraft drawings and find wide use in all parts of commercial and military aircraft. They are supplied as replacement parts for maintenance and repair work as well as to aircraft manufacturers.

Unfinished Hexagon Head Machine Bolts are the most commonly used bolts for general purpose work.

Semi-finished Hexagon Head Machine Bolts are used in place of unfinished bolts where a washer face is required to seat against a spot faced or finished surface.

Hexagon Head Cap Screws are used in tapped holes or where it is necessary to wrench up the bolt head rather than the nut.

Carriage bolts are normally used in fastening wood or other soft materials.

Socket Head Cap screws are used in counterbored holes or where space limitations prohibit the use of a hexagon head.

The "Alcoa Economy Bolt" has been so named because it is a low cost, high quality fastener. Made to the dimensional and tolerance standards for semi-finished hexagon head bolts, these bolts are entirely suitable to replace more expensive trimmed head bolts for most applications. They are carried in stock in popular sizes in bright finish.

Bolts and cap screws in the normal range of sizes are upset and may have rolled or cut threads. In the large sizes bolts and cap screws are usually milled from bar.



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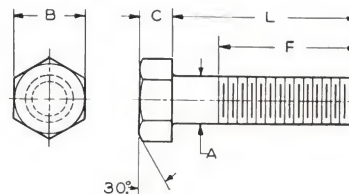
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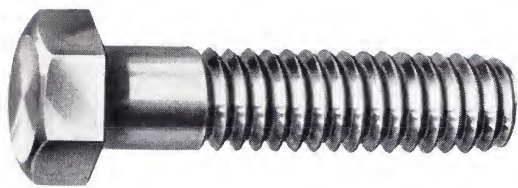
HEXAGON HEAD UNFINISHED REGULAR MACHINE BOLTS

ALCOA 24S-T4 ALLOY**(American Standard B18.2)****DIMENSIONS IN INCHES**

Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Width Across Flats B	Head Height C
1/4	1/4-20	.2500 .2428	3/8	11/64
5/16	5/16-18	.3125 .3043	1/2	13/64
3/8	3/8-16	.3750 .3660	9/16	1/4
7/16	7/16-14	.4375 .4277	5/8	19/64
1/2	1/2-13	.5000 .4896	3/4	21/64
9/16	9/16-12	.5625 .5513	7/8	3/8
5/8	5/8-11	.6250 .6132	15/16	27/64
3/4	3/4-10	.7500 .7372	1-1/8	1/2
7/8	7/8-9	.8750 .8610	1-5/16	19/32
1	1-8	1.0000 .9848	1-1/2	21/32

1. For length of usable thread F see table of Minimum Length of Threaded Portion of Bolts—page 228, Table No. 12.
2. Threads are Class 2 free fit.
3. Shipped in bulk or boxed in quantities indicated on next page.
4. Bolts up to 1/2" dia. and in lengths up to approximately 4" are normally cold headed and supplied in bright (burnished) finish; other sizes are milled from bar and supplied in machine finish.
5. Will be furnished with Alcoa's Alumilite finish, if specified.
6. Bolts may be furnished with fine threads on special order.
7. The maximum radius of fillet under head is 1/32" for sizes 1/4" to 1/2", and 1/16" for sizes 9/16" to 1".





ALCOA

HEXAGON HEAD UNFINISHED REGULAR MACHINE BOLTS

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size							Packing
	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13	9/16-12	5/8-11	
1/2	.398★	.745★	1.13					100 Pieces Per Box
5/8	.445	.820	1.24	1.77				
3/4	.491★	.895★	1.35★	1.92	2.81			
7/8	.551	.988	1.48	2.09	3.01	4.29		
1	.611★	1.08★	1.60★	2.26	3.21★	4.54	5.77★	
1-1/4	.731★	1.27★	1.87★	2.63	3.70★	5.16	6.40★	
1-1/2	.851★	1.46★	2.15★	3.00	4.19★	5.77	7.04★	
1-3/4	.956★	1.63★	2.39★	3.34	4.67★	6.39	7.92★	
2	1.08★	1.82★	2.66★	3.71	5.16★	7.00	8.68★	50 Pieces Per Box
2-1/4	1.18	1.99	2.94	4.08	5.64	7.61	9.44★	
2-1/2	1.30★	2.18★	3.21★	4.45	6.03★	8.23	10.2★	
2-3/4	1.42	2.36	3.48	4.82	6.61	8.84	11.0	
3	1.54★	2.55★	3.75★	5.19	7.10★	9.46	11.7★	
3-1/4	1.66	2.74	3.98	5.50	7.50	9.98	12.3	
3-1/2	1.78	2.93	4.25★	5.87	7.99★	10.6	13.1★	
3-3/4	1.90	3.12	4.52	6.24	8.47	11.2	13.9	
4	2.02	3.31	4.80★	6.61	8.95★	11.8	14.6★	
4-1/2	2.26	3.68	5.34	7.35	9.93	13.0	16.1	
5	2.50	4.06	5.88	8.10	10.9	14.3	17.7	
5-1/2	2.75	4.45	6.44	8.86	11.9	15.6	19.2	
6	3.00	4.83	6.99	9.62	12.9	16.8	20.8	Normally Packed in Bulk

- Weights given are for coarse thread series. Bolts in the fine thread series will be slightly heavier.
- Items marked "★" are normally carried in stock by Alcoa.



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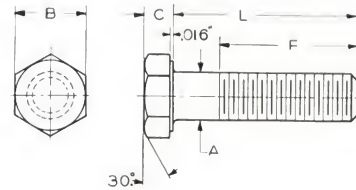
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ALCOA

HEXAGON HEAD SEMI-FINISHED REGULAR MACHINE BOLTS

ALCOA 24S-T4 ALLOY
 (American Standard B18.2)

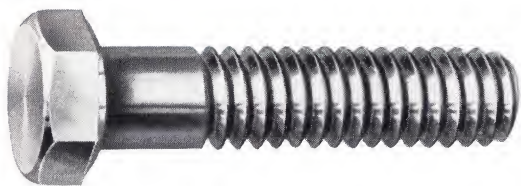
DIMENSIONS IN INCHES



Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Width Across Flats B	Head Height C
1/4	1/4-20	.2500 .2428	3/8	5/32
5/16	5/16-18	.3125 .3043	1/2	3/16
3/8	3/8-16	.3750 .3660	9/16	15/64
7/16	7/16-14	.4375 .4277	5/8	9/32
1/2	1/2-13	.5000 .4896	3/4	19/64
9/16	9/16-12	.5625 .5513	7/8	11/32
5/8	5/8-11	.6250 .6132	15/16	25/64
3/4	3/4-10	.7500 .7372	1-1/8	15/32
7/8	7/8-9	.8750 .8610	1-5/16	9/16
1	1-8	1.0000 .9848	1-1/2	19/32

- For length of usable thread F see table of Minimum Length of Threaded Portion of Bolts—page 228, Table No. 12.
- Threads are Class 2 free fit.
- Shipped in bulk or boxed in quantities indicated on next page.
- Bolts up to 1/2" diameter and in lengths up to approximately 4" are normally cold headed and supplied in bright (burnished) finish; other sizes are milled from bar and supplied in machine finish.
- Will be furnished with Alcoa's Alumilite finish, if specified.
- Bolts may be furnished with fine threads on special order.
- The maximum radius of fillet under head is 1/32" for sizes 1/4" to 1/2", and 1/16" for sizes 9/16" to 1".





ALCOA

HEXAGON HEAD SEMI-FINISHED REGULAR MACHINE BOLTS

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size							Packing
	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13	9/16-12	5/8-11	
1/2	.377	.707	1.08					100 Pieces Per Box
5/8	.424	.782	1.19	1.71				
3/4	.470	.857	1.30	1.86	2.65			
7/8	.530	.950	1.43	2.03	2.85	4.07		
1	.590	1.04	1.55	2.20	3.05	4.32	5.52	50 Pieces Per Box
1-1/4	.710	1.23	1.82	2.57	3.54	4.94	6.15	
1-1/2	.830	1.42	2.10	2.94	4.03	5.55	6.79	
1-3/4	.935	1.59	2.34	3.28	4.51	6.17	7.67	
2	1.06	1.78	2.61	3.65	5.00	6.78	8.43	
2-1/4	1.16	1.95	2.89	4.02	5.48	7.39	9.19	
2-1/2	1.28	2.14	3.16	4.39	5.87	8.01	10.0	
2-3/4	1.40	2.32	3.43	4.76	6.45	8.62	10.8	
3	1.52	2.51	3.70	5.13	6.94	9.24	11.5	
3-1/4	1.64	2.70	3.93	5.44	7.34	9.76	12.1	
3-1/2	1.76	2.89	4.20	5.81	7.83	10.4	12.9	
3-3/4	1.88	3.08	4.47	6.18	8.31	11.0	13.7	
4	2.00	3.27	4.75	6.55	8.79	11.6	14.4	
4-1/2	2.24	3.62	5.29	7.29	9.77	12.8	15.9	
5	2.48	4.02	5.83	8.04	10.7	14.1	17.5	Normally Packed in Bulk
5-1/2	2.73	4.41	6.39	8.80	11.7	15.4	19.0	
6	2.98	4.79	6.94	9.56	12.7	16.6	20.6	

1. Weights given are for coarse thread series. Bolts in the fine thread series will be slightly heavier.
2. Semi-finished bolts are not normally carried in stock by Alcoa.



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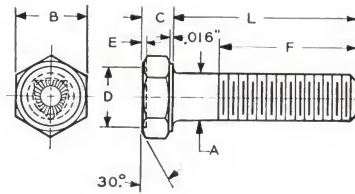
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ALCOA

ECONOMY BOLTS (SPECIAL HEXAGON HEAD SEMI-FINISHED REGULAR MACHINE BOLTS)



ALCOA 245-T4 ALLOY

DIMENSIONS IN INCHES

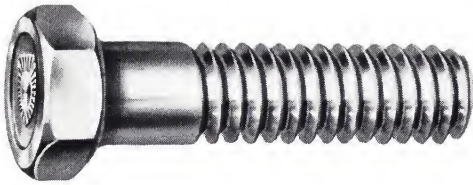
Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Width Across Flats B	Head Height C	Approximate Diameter Recess D	Approximate Depth Recess E
10	10-24	.1900 .1834	5/16	7/64	.260	.010
1/4	1/4-20	.2500 .2428	3/8	5/32	.312	.010
5/16	5/16-18	.3125 .3043	1/2	3/16	.416	.012
3/8	3/8-16	.3750 .3660	9/16	15/64	.468	.016
1/2	1/2-13	.5000 .4896	3/4	19/64	.609	.019
5/8	5/8-11	.6250 .6132	15/16	25/64	.734	.025
3/4	3/4-10	.7500 .7372	1-1/8	15/32	.938	.031

- These special bolts with upset heads are in most cases an economical and satisfactory substitution for trimmed head bolts.
- With the exception of the 10-24 size these bolts conform to the American Standard specification B 18.2 dimensions for hexagon head semifinished regular machine bolts except for the head recess and a slight rounding of the bottom and outside edges of the hexagon head.
- Thread length, usable—F
For No. 10, 1/4", 5/16", and 3/8" diameter bolts:

up to 1" long, threaded to head	1-3/4" long, threaded 7/8"	2-1/2" long, threaded 7/8"
1-1/4" long, threaded 3/4"	2" long, threaded 1-1/8"	2-3/4" long, threaded 1-1/8"
1-1/2" long, threaded 1"	2-1/4" long, threaded 1-3/8"	3" long, threaded 1-3/8"

 Larger diameters and longer lengths will be threaded in accordance with Table No. 12, page 228.
- Threads are Class 2 free fit.
- Shipped in bulk or boxed in quantities indicated on next page.
- Normally furnished in bright finish.
- Will be furnished with Alcoa's Alumilite finish, if specified.
- Bolts may be furnished with fine threads on special order.
- The maximum radius of fillet under head is 1/32" for sizes No. 10 to 1/2", and 1/16" for 5/8" and 3/4" sizes.





ALCOA

ECONOMY BOLTS

(SPECIAL HEXAGON HEAD
SEMI-FINISHED REGULAR
MACHINE BOLTS)

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size						Packing
	10-24	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	
1/2	.192★	.369	.691	1.05			100 Pieces Per Box
5/8	.218	.416	.766	1.16			
3/4	.244★	.462★	.841★	1.27★	2.59		
7/8	.270	.522	.934	1.40	2.79		
1	.296★	.582★	1.02 ★	1.52★	2.99	5.41	50 Pieces Per Box
1-1/4	.347	.702	1.21	1.79	3.48	6.04	
1-1/2	.399★	.822★	1.40 ★	2.07★	3.97	6.68	
1-3/4	.451	.927	1.57	2.31	4.45	7.56	
2	.512★	1.05 ★	1.76 ★	2.58★	4.94	8.32	
2-1/4	.582	1.15	1.93	2.86	5.42	9.08	
2-1/2	.651★	1.27 ★	2.12 ★	3.13★	5.81	9.89	
2-3/4	.721	1.39	2.30	3.40	6.39	10.7	
3	.791	1.51	2.49	3.67	6.88	11.4	
3-1/4	.860	1.63	2.68	3.90	7.28	12.0	
3-1/2	.930	1.75	2.87	4.17	7.77	12.8	Normally Packed in Bulk
3-3/4	.999	1.87	3.06	4.44	8.25	13.6	
4	1.07	1.99	3.25	4.72	8.73	14.3	
4-1/2	2.23	3.60	5.26	Normally Packed in Bulk
5	.....	2.47	4.00	5.80	.....	.....

- Weights given are for the coarse thread series. Bolts in the fine thread series will be slightly heavier.
- Items marked "★" are normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



69

Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Nuts and
Nails

9

Misc.
Fasteners,
Accessories

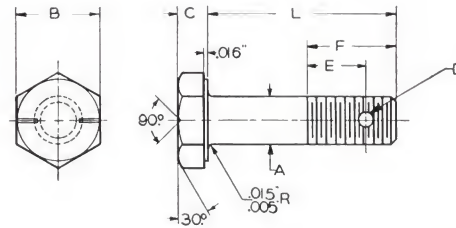
10

Design
Information
Tables

11

ALCOA HEXAGON HEAD AIRCRAFT BOLTS

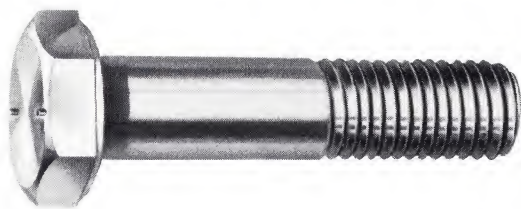
ALCOA 24S-T4 ALLOY
(Army-Navy Aircraft Standard)



DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Width Across Flats B	Head Height C	Cross Hole Diameter D	Cross Hole Location E	Thread Length Usable F
10 .190	10—32	.189 .186	.375 $^{+.002}_{-.010}$	1/8	.070	17/64	13/32
1/4 .250	1/4—28	.249 .246	.438 $^{+.002}_{-.010}$	5/32	.076	5/16	15/32
5/16 .3125	5/16—24	.312 .309	.500 $^{+.002}_{-.010}$	3/16	.076	23/64	17/32
3/8 .375	3/8—24	.374 .371	.563 $^{+.002}_{-.010}$	7/32	.106	7/16	41/64
7/16 .4375	7/16—20	.437 .433	.625 $^{+.002}_{-.010}$	1/4	.106	31/64	21/32
1/2 .500	1/2—20	.499 .495	.750 $^{+.002}_{-.010}$	9/32	.106	39/64	25/32
9/16 .5625	9/16—18	.562 .558	.875 $^{+.002}_{-.010}$	5/16	.141	21/32	29/32
5/8 .625	5/8—18	.624 .620	.938 $^{+.002}_{-.010}$	11/32	.141	47/64	61/64
3/4 .750	3/4—16	.749 .744	1.063 $^{+.003}_{-.010}$	13/32	.141	7/8	1-3/32
7/8 .875	7/8—14	.874 .869	1.250 $^{+.003}_{-.010}$	15/32	.141	63/64	1-1/4
1 1.000	1—14	.999 .993	1.438 $^{+.003}_{-.010}$	17/32	.141	1-3/32	1-3/8
1-1/8 1.125	1-1/8—12	1.124 1.118	1.625 $^{+.003}_{-.010}$	19/32	.141	1-3/16	1-1/2
1-1/4 1.250	1-1/4—12	1.249 1.243	1.812 $^{+.003}_{-.010}$	21/32	.141	1-3/8	1-11/16

1. Bolts can be made in all diameters listed and in lengths to 10".
2. These bolts conform to the material and dimensional requirements of Army-Navy (Aircraft) Standards AN3 to AN20.
3. All threads are Class 3 medium fit.
4. Bolts can be supplied with or without cotter pin hole in shank and/or lock wire hole in head.
5. Shipped in bulk or boxed in quantities indicated on next page.
6. Bolts up to 5/8" diameter and in lengths up to approximately 4" are normally cold headed and supplied in bright (burnished) finish.
Larger diameters and longer lengths are normally cut from bar and are supplied in machine finish.
7. Will be furnished with Alcoa's Alumilite No. 205 finish, if specified.
8. Coarse pitch threads and special thread lengths will be made on special order.



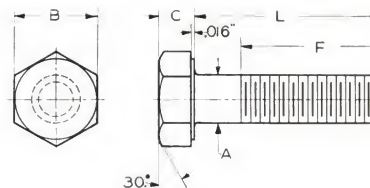
ALCOA HEXAGON HEAD AIRCRAFT BOLTS

WEIGHT PER 100 PIECES (Approximate Lbs.) (Army-Navy Aircraft Standard)

Nominal Length (Excluding Chamfer) L Inches	AN Dwg. Dash No.	Thread Size and "AN" Drawing Number								Packing
		10-32	1/4-28	5/16-24	3/8-24	7/16-20	1/2-20	9/16-18	5/8-18	
		AN3DD	AN4DD	AN5DD	AN6DD	AN7DD	AN8DD	AN9DD	AN10DD	
3/8	3	.261								100 Pieces Per Box
1/2	4	.279	.479	.797						
5/8	5	.314	.540	.893	1.29	1.79				
3/4	6	.350	.601	.990	1.42	1.98	2.85	4.22		
7/8	7	.385	.663	1.09	1.56	2.17	3.09	4.38	5.43	
1	10	.420	.724	1.18	1.70	2.36	3.34	4.69	5.82	
1-1/8	11	.456	.786	1.28	1.84	2.55	3.59	5.01	6.20	
1-1/4	12	.491	.847	1.38	1.98	2.74	3.83	5.32	6.59	
1-3/8	13	.526	.908	1.47	2.12	2.93	4.08	5.63	6.97	
1-1/2	14	.562	.970	1.57	2.25	3.12	4.32	5.94	7.36	
1-5/8	15	.597	1.03	1.66	2.39	3.31	4.57	6.23	7.74	
1-3/4	16	.632	1.09	1.76	2.53	3.50	4.82	6.57	8.13	
1-7/8	17	.668	1.15	1.86	2.67	3.68	5.06	6.88	8.51	
2	20	.703	1.22	1.95	2.81	3.87	5.31	7.19	8.90	
2-1/8	21	.738	1.28	2.05	2.90	4.06	5.55	7.50	9.28	
2-1/4	22	.774	1.34	2.15	3.09	4.25	5.80	7.82	9.67	
2-3/8	23	.809	1.40	2.24	3.22	4.44	6.05	8.13	10.03	
2-1/2	24	.845	1.46	2.34	3.36	4.63	6.30	8.44	10.4	
2-5/8	25	.880	1.52	2.43	3.50	4.82	6.54	8.75	10.8	
2-3/4	26	.915	1.58	2.53	3.64	5.01	6.79	9.07	11.2	
2-7/8	27	.950	1.64	2.63	3.78	5.20	7.03	9.38	11.6	50 Pieces Per Box
3	30	.986	1.71	2.72	3.92	5.39	7.28	9.70	12.0	
3-1/8	31	1.023	1.77	2.82	4.05	5.57	7.53	10.00	12.4	
3-1/4	32	1.06	1.83	2.92	4.19	5.76	7.78	10.3	12.8	
3-3/8	33	1.09	1.89	3.01	4.33	5.95	8.02	10.6	13.2	
3-1/2	34	1.13	1.95	3.11	4.47	6.14	8.27	10.9	13.5	
3-5/8	35	1.16	2.01	3.20	4.61	6.33	8.51	11.25	13.9	
3-3/4	36	1.2	2.07	3.30	4.75	6.52	8.76	11.6	14.3	
3-7/8	37	1.23	2.13	3.40	4.88	6.71	9.01	11.9	14.7	
4	40	1.27	2.20	3.50	5.02	6.90	9.26	12.2	15.1	
4-1/4	42	1.34	2.32	3.69	5.30	7.28	9.75	12.8	15.8	
4-1/2	44	1.41	2.44	3.88	5.58	7.65	10.2	13.4	16.6	
4-3/4	46	1.48	2.57	4.07	5.86	8.03	10.7	14.1	17.4	
5	50	1.55	2.69	4.27	6.13	8.41	11.2	14.7	18.2	
5-1/4	52	1.62	2.81	4.46	6.41	8.79	11.7	15.3	18.9	
5-1/2	54	1.69	2.93	4.65	6.69	9.17	12.2	15.9	19.7	
5-3/4	56	1.76	3.06	4.84	6.96	9.54	12.7	16.6	20.5	
6	60	1.83	3.18	5.04	7.24	9.92	13.2	17.2	21.2	
6-1/4	62	1.91	3.30	5.23	7.52	10.3	13.7	17.8	22.0	
6-1/2	64	1.98	3.43	5.42	7.79	10.7	14.2	18.4	22.8	
6-3/4	66	2.05	3.55	5.62	8.07	11.1	14.7	19.1	23.5	Nor- mally Shipped in Bulk
7	70	2.12	3.67	5.81	8.35	11.4	15.2	19.7	24.3	
7-1/4	72	2.19	3.79	6.00	8.63	11.8	15.7	20.3	25.1	
7-1/2	74	2.26	3.92	6.19	8.90	12.2	16.2	20.9	25.9	
7-3/4	76	2.33	4.04	6.39	9.18	12.6	16.7	21.6	26.6	
8	80	2.40	4.16	6.58	9.46	12.9	17.1	22.2	27.4	

ALCOA

HEXAGON HEAD CAP SCREWS



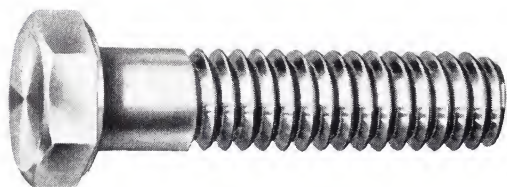
ALCOA 24S-T4 ALLOY
(American Standard B18.2)

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Width Across Flats B	Head Height C	Thread Length Usable F
1/4	1/4-20	.2500 .2428	7/16	3/16	3/4
5/16	5/16-18	.3125 .3043	1 2	15/64	7/8
3/8	3/8-16	.3750 .3660	9/16	9/32	1
7/16	7/16-14	.4375 .4277	5 8	21/64	1-1/8
1/2	1/2-13	.5000 .4896	3 4	3 8	1-1/4
9/16	9/16-12	.5625 .5513	13/16	27/64	1-3/8
5/8	5/8-11	.6250 .6132	7 8	15/32	1-1/2
3/4	3/4-10	.7500 .7372	1	9/16	1-3/4
7/8	7/8-9	.8750 .8610	1-1/8	21/32	2
1	1 8	1.0000 .9848	1-5/16	3/4	2-1/4

1. Threads are Class 2 free fit.
2. Shipped in bulk or boxed in quantities indicated on next page.
3. Cap screws up to 1/2" diameter and in lengths up to approximately 4" are normally cold headed and supplied in bright (burnished) finish; other sizes are milled from bar and supplied in machine finish.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Cap screws may be furnished with fine threads on special order.
6. The maximum radius of fillet under head is 1/64" for sizes 1/4" to 5/8", and 1/32" for sizes 11/16" to 1".





ALCOA

HEXAGON HEAD CAP SCREWS

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size							Packing
	1/4-20	5/16-18	3/8-16	7/16-14	1/2-13	9/16-12	5/8-11	
1/2	.559★	.897★	1.33					100 Pieces Per Box
5/8	.621★	.993	1.47	2.07				
3/4	.682★	1.09★	1.61★	2.26	3.33			
7/8	.745	1.19	1.75	2.45	3.57	4.62		
1	.806★	1.28★	1.89★	2.63	3.82	4.93	6.22	50 Pieces Per Box
1-1/4	.930★	1.48★	2.17★	3.01	4.32	5.55	6.99	
1-1/2	1.05★	1.67★	2.44★	3.39	4.81	6.18	7.76	
1-3/4	1.18	1.86	2.72	3.77	5.30	6.80	8.54	
2	1.30★	2.06★	3.00★	4.15	5.80	7.43	9.31	50 Pieces Per Box
2-1/4	1.42	2.25	3.28	4.53	6.29	8.06	10.1	
2-1/2	1.55	2.44	3.56	4.90	6.79	8.68	10.9	
2-3/4	1.67	2.64	3.83	5.28	7.28	9.31	11.6	
3	1.80	2.83	4.11	5.66	7.78	9.93	12.4	50 Pieces Per Box
3-1/4	1.92	3.02	4.39	6.04	8.27	10.6	13.2	
3-1/2	2.04	3.22	4.67	6.42	8.77	11.2	14.0	
3-3/4	2.17	3.41	4.95	6.80	9.26	11.8	14.7	
4	2.29	3.60	5.23	7.18	9.76	12.4	15.5	50 Pieces Per Box
4-1/2	2.54	3.99	5.78	7.93	10.7	13.7	17.0	
5	2.78	4.37	6.34	8.69	11.7	14.9	18.6	
5-1/2	3.03	4.76	6.90	9.45	12.7	16.2	20.1	
6	3.27	5.14	7.45	10.2	13.7	17.4	21.7	Normally Packed in Bulk

- Weights given are for coarse thread series. Cap screws in the fine thread series will be slightly heavier.
- Items marked "★" are normally carried in stock by Alcoa.



Nuts

4

Machine
Screws

5

Wood
Screws,
Lag Bolts

6

Sheet
Metal
Screws

7

Washers

8

Rivets and
Nails

9

Misc.
Fasteners,
Accessories

10

Design
Information
and Tables

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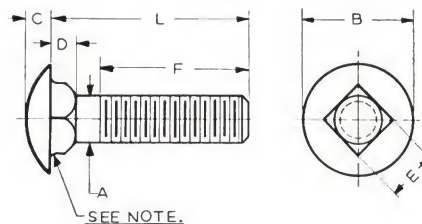
ALCOA

SQUARE NECK CARRIAGE BOLTS

Bright Finish

ALCOA 24S-T4 ALLOY
(American Standard B18.5)

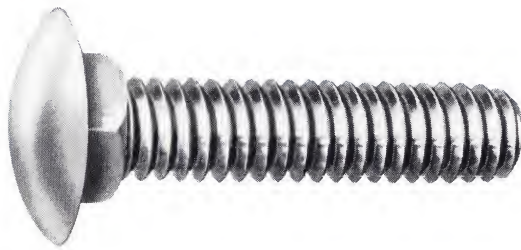
DIMENSIONS IN INCHES



Nominal Size or Basic Major Diameter A	Thread Size	Head Diameter (Min.) B	Head Height (Min.) C	Minimum Depth of Square D	Width of Square (Max.) E
10	10-24	7/16	3/32	1-1/8 and shorter . . 3/32 1-1/4 and longer . . 3/16	.199
1/4	1/4-20	9/16	1/8	1-1/4 and shorter . . 1/8 1-3/8 and longer . . 7/32	.260
5/16	5/16-18	11/16	5/32	1-1/4 and shorter . . 5/32 1-3/8 and longer . . 1/4	.324
3/8	3/8-16	13/16	3/16	1-1/2 and shorter . . 3/16 1-5/8 and longer . . 9/32	.388
7/16	7/16-14	15/16	7/32	1-1/2 and shorter . . 7/32 1-5/8 and longer . . 5/16	.452
1/2	1/2-13	1-1/16	1/4	1-7/8 and shorter . . 1/4 2 and longer . . 11/32	.515
9/16	9/16-12	1-3/16	9/32	1-7/8 and shorter . . 9/32 2 and longer . . 3/8	.579
5/8	5/8-11	1-5/16	5/16	1-7/8 and shorter . . 5/16 2 and longer . . 13/32	.642

1. For length of usable thread F see table of Minimum Length of Threaded Portion of Bolts—page 228, Table No. 12.
2. Threads are Class 2 free fit.
3. Shipped in bulk or boxed in quantities indicated on next page.
4. Where tools are available bolts are cold headed and supplied in bright (burnished) finish; other sizes are milled from bar and supplied in machine finish.
5. Will be furnished with Alcoa's Alumilite finish, if specified.
6. Bolts may be furnished with fine threads on special order.
7. Maximum radius of fillet under head of bolt for sizes No. 10 to 1/2" inclusive is 1/32", and for sizes 9/16" and 5/8" is 1/16".
8. Bolts up to 3/8" diameter and 4" long will have rolled threads and undersize unthreaded section; larger diameters and/or longer lengths will have cut threads with full size unthreaded section.





ALCOA SQUARE NECK CARRIAGE BOLTS

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size						Packing
	10-24	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	
1/2	.213	.416					100 Pieces Per Box
5/8	.245	.470					
3/4	.276★	.523	.884	1.37			
7/8	.302	.570	.962	1.48			
1	.328★	.616★	1.04★	1.59			
1-1/4	.407	.740	1.23	1.87			
1-1/2	.479★	.877★	1.42★	2.12★	4.04		
1-3/4	.550	1.00	1.62	2.42	4.53		
2	.622★	1.13 ★	1.79★	2.67★	4.99	8.16	50 Pieces Per Box
2-1/4	.693	1.25	1.92	2.95	5.48	8.94	
2-1/2	.765★	1.37 ★	2.17★	3.23★	5.98	9.71	
2-3/4	.837	1.50	2.37	3.51	6.47	10.5	
3	.908★	1.60 ★	2.56★	3.79★	6.97	11.3	
3-1/4	.980	1.72	2.75	4.07	7.47	12.0	
3-1/2	1.05 ★	1.85 ★	2.95★	4.34★	7.96	12.8	
3-3/4	1.12	1.97	3.14	4.62	8.46	13.6	
4	1.19 ★	2.10 ★	3.33★	4.90★	8.95	14.4	Normally Packed in Bulk
4-1/2	1.34	2.34	3.72	5.46	9.94	15.9	
5	1.48	2.59	4.10	6.02	10.9	17.4	
5-1/2	1.62	2.84	4.49	6.58	11.6	19.0	
6	1.77	3.09	4.88	7.13	12.9	20.5	

- Weights given are for coarse thread series. Bolts in the fine thread series will be slightly heavier.
- Items marked "★" are normally carried in stock by Alcoa.



Nuts
④
Machine
Screws
⑤
Wood
Screws,
Lag Bolts
⑥
Sheet
Metal
Screws
⑦
Washers
⑧
Nuts and
Nails
⑨
Misc.
Fasteners,
Accessories
⑩
Sign
Material
Tables
⑪

ALCOA

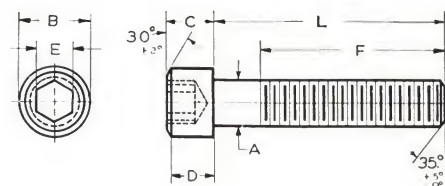
HEXAGONAL SOCKET CAP SCREWS

Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.3)

DIMENSIONS IN INCHES



Nominal Size or Basic Major Diameter	Thread Size	Body Diameter A	Head Diameter B	Head Height C	Head Side Height D	Socket Width Across Flats E
8 .164	8-32	.164 .1613	.281 .276	.164 .160	.1522 .1484	.127 .125
10 .190	10-24	.190 .1867	.312 .306	.190 .185	.1765 .1717	.1582 .156
1/4 .250	1/4-20	.250 .2464	.375 .367	.250 .244	.2317 .2265	.1895 .188
5/16 .3125	5/16-18	.3125 .3084	.437 .429	.312 .306	.2894 .2834	.2207 .219
3/8 .375	3/8-16	.375 .3705	.563 .553	.375 .368	.3469 .3405	.3155 .312
1/2 .500	1/2-13	.500 .4948	.750 .739	.500 .492	.462 .4546	.378 .375
5/8 .625	5/8-11	.625 .6191	.875 .863	.625 .616	.5771 .5687	.503 .500
3/4 .750	3/4-10	.750 .7436	1.000 .987	.750 .741	.692 .683	.5655 .563

1. All threads are Class 3 medium fit.
2. Screws will be made with American National Fine threads on special order.
3. Thread length, usable—F
Coarse thread series—twice the screw diameter plus 1/2" or one-half the screw length whichever is greater.
Fine thread series—one and one-half times the screw diameter plus 1/2" or three-eighths the screw length, whichever is greater.
4. Shipped in bulk or packed 100 pcs. per box for sizes through 1/2" diameter, and 50 pcs. per box for larger sizes.





ALCOA

HEXAGONAL SOCKET CAP SCREWS

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size							Packing
	8-32	10-24	1/4-20	5/16-18	3/8-16	1/2-13	5/8-11	
1/2	.166	.220	.405	.674				100 Pieces Per Box
5/8	.186	.246	.452	.750	1.26			
3/4	.207	.272	.498	.825	1.37	2.98		
7/8	.229	.298	.545	.900	1.48	3.18		
1	.256	.333	.592	.976	1.59	3.38	5.34	50 Pieces Per Box
1-1/4	....	.403	.714	1.15	1.81	3.78	5.98
1-1/2	....	.473	.836	1.34	2.09	4.18	6.61
1-3/4	....	.543	.957	1.53	2.36	4.67	7.25
2	....	.604	1.08	1.72	2.64	5.16	8.01
2-1/4	....	....	1.19	1.91	2.91	5.65	8.78
2-1/2	....	....	1.29	2.08	3.19	6.14	9.55
2-3/4	....	....	1.40	2.25	3.43	6.63	10.3
3	....	....	1.51	2.42	3.68	7.12	11.1
3-1/4	....	....	....	2.59	3.93	7.56	11.8
3-1/2	....	....	....	2.76	4.18	8.01	12.6
3-3/4	....	....	....	....	4.43	8.45	13.3
4	....	....	....	....	4.68	8.90	14.0

1. Weights given are for coarse thread series. Cap Screws in the fine thread series will be slightly heavier.
2. Socket Cap Screws are not normally carried in stock by Alcoa.

Nuts

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Screws

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Nuts

④

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NUTS

Alcoa aluminum nuts are produced in a variety of types to be used with all types of threaded Alcoa fasteners. They should be used whenever a nut is required for engagement with a threaded aluminum part to eliminate the possibility of galvanic corrosion between dissimilar metals. Alcoa hex nuts are all milled from bar while square nuts may be milled or punched.

Regular Semi-finished Hexagon Nuts are furnished in all of the common bolt sizes and are the most widely used nuts in these sizes. They are suitable for all general fastening applications and are washer-faced to permit seating against a finished or spot-faced surface.

Regular Unfinished Square Nuts are used on rough work usually with square head bolts or carriage bolts.

Aircraft Hexagon Nuts are furnished in the fine thread series for use with aircraft bolts.

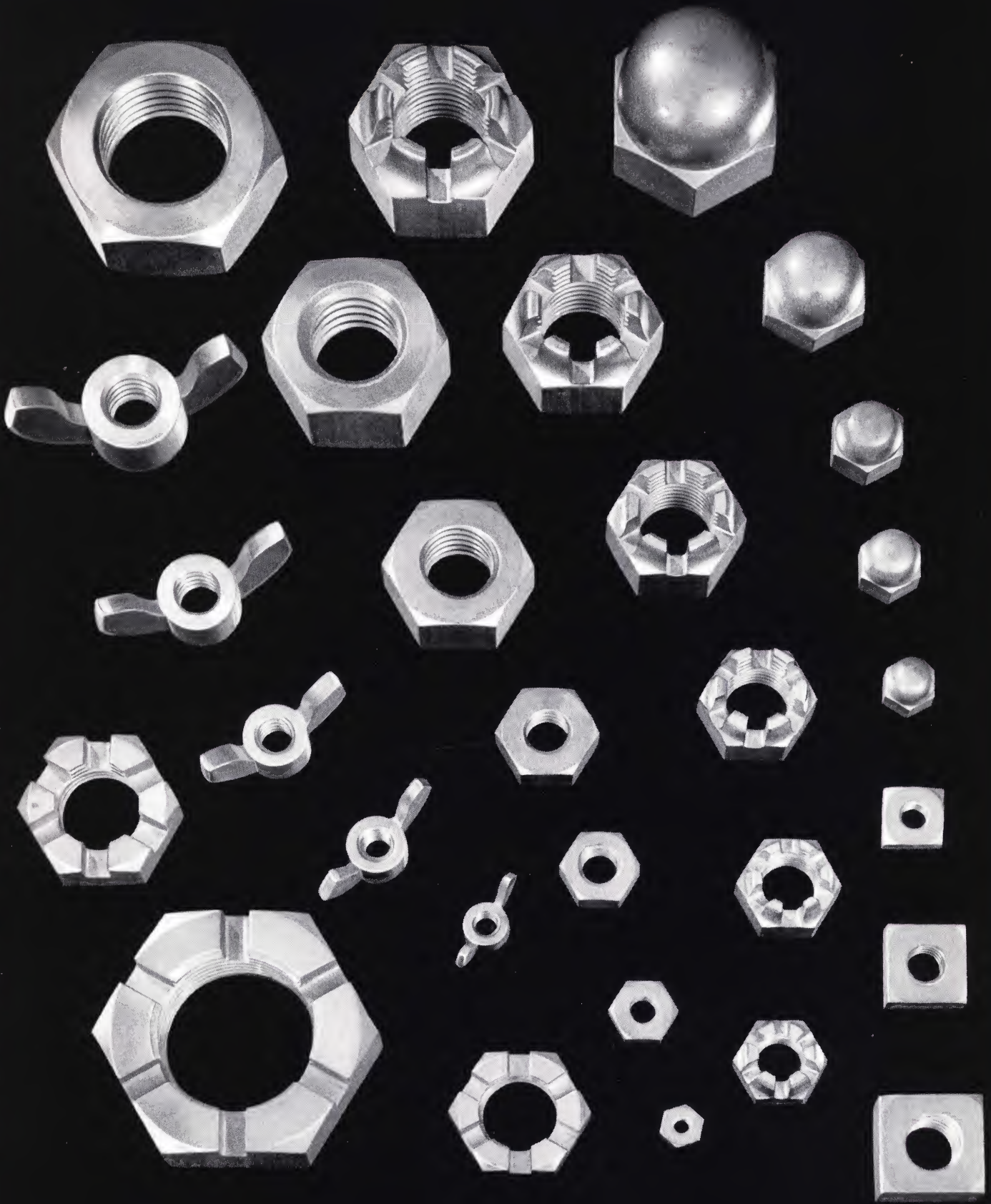
Aircraft Hexagon Jam Nuts are used as lock nuts in assembly with regular hexagon aircraft nuts.

Aircraft Castle and Shear Nuts are used in assemblies having drilled bolts for the insertion of a lock wire or cotter pin.

Hexagon Machine Screw Nuts and Aircraft Hexagon Machine Screw Nuts are identical except that the latter are washer-faced while the former are not. Both are used in assemblies with machine screws and are manufactured in the normal range of machine screw sizes. Since both types are milled from bar, the incorporation of the washer face is possible at no extra cost and results in a better quality product. For this reason Alcoa has adopted the aircraft nut as its standard stock product and furnishes this style for commercial as well as aircraft applications unless otherwise instructed by the customer.

Square machine screw nuts are sometimes used in place of hexagon nuts where lowest possible cost is of greater importance than the advantages of the hexagon nut.

Alcoa aluminum wing nuts are wrought products of superior strength and appearance. Accurately tapped holes and high grade workmanship throughout make these nuts a logical choice where assemblies must be tightened by hand. Carried in stock in all popular sizes; special threads may be tapped in standard blanks if required.



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Screws

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Lag Bolts

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ALCOA

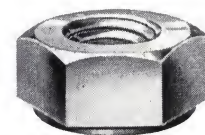
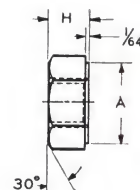
HEXAGON SEMI-FINISHED REGULAR NUTS

Chamfered and Washer Faced
Bright Finish*—Milled from Bar

ALCOA 24S-T4 ALLOY

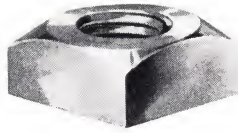
(American Standard B18.2)

DIMENSIONS IN INCHES



Nominal Size	Threads Per Inch Coarse	Width Across Flats A	Thickness H	Weight (Lbs.) Per 100 Pieces
1/4	20★	7/16	13/64	.261
5/16	18★	9/16	1/4	.534
3/8	16★	5/8	5/16	.782
7/16	14	3/4	23/64	1.32
1/2	13★	13/16	27/64	1.74
9/16	12	7/8	31/64	2.23
5/8	11★	1	17/32	3.27
3/4	10	1-1/8	41/64	4.66
7/8	9	1-5/16	3/4	7.41
1	8	1-1/2	55/64	11.1
1-1/8	7	1-11/16	31/32	15.8
1-1/4	7	1-7/8	1-1/16	21.2

1. All threads are Class 2 free fit.
2. Items marked "★" are normally carried in stock by Alcoa.
3. Packed in bulk or boxed 100 per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Nuts with fine pitch threads can be made on special order.
6. *Nuts 7/8" and larger are furnished in machine finish.



SQUARE UNFINISHED REGULAR NUTS

Top Chamfered

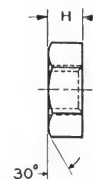
ALCOA 24S-T4 ALLOY

DIMENSIONS IN INCHES

(American Standard B18.2)

Nominal Size	Threads Per Inch Coarse	Width Across Flats A	Thickness H	Weight (Lbs.) Per 100 Pieces
3/16 (#10)	24★	3/8	.165	.200
1/4	20★	7/16	7/32	.340
5/16	18★	9/16	17/64	.695
3/8	16★	5/8	21/64	.997
7/16	14	3/4	3/8	1.67
1/2	13	13/16	7/16	2.20
9/16	12	7/8	1/2	2.83
5/8	11	1	35/64	4.34
3/4	10	1-1/8	21/32	5.91
7/8	9	1-5/16	49/64	9.37
1	8	1-1/2	7/8	14.0

1. All threads are Class 2 free fit.
2. Packed in bulk or boxed 100 per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Nuts with fine pitch threads can be made on special order.
5. Items marked "★" are normally carried in stock by Alcoa.

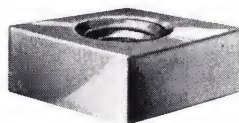
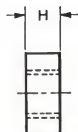
ALCOA**HEXAGON MACHINE SCREW NUTS****Top Chamfered****Bright Finish—Milled from Bar****ALCOA 245-T4 ALLOY****(American Standard B18.2)****DIMENSIONS IN INCHES**

Nominal Size	Threads Per Inch		Width Across Flats A	Thickness H	Weight (Lbs.) Per Gross
	Coarse	Fine			
2	56	64	3/16	1/16	.022
3	48	56	3/16	1/16	.021
4	40	48	1/4	3/32	.061
5	40	44	5/16	7/64	.116
6	32	40	5/16	7/64	.113
8	32	36	11/32	1/8	.151
10	24	32	3/8	1/8	.176
12	24	28	7/16	5/32	.337
1/4	20	28	7/16	3/16	.341
5/16	18	24	9/16	7/32	.662
3/8	16	24	5/8	1/4	.890

1. All threads are Class 2 free fit.
2. Packed in bulk or boxed 1 gross per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Plain faced machine screw nuts are not normally carried in stock. See page 86 for stock items in washer faced machine screw nuts.



ALCOA



SQUARE MACHINE SCREW AND STOVE BOLT NUTS

Unchamfered—Bright Finish

ALCOA 24S-T4 ALLOY
(American Standard B18.2)

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch		Width Across Flats A	Thickness H	Weight (Lbs.) Per Gross
	Coarse	Fine			
2	56	64	3/16	1/16	.027
3	48	56	3/16	1/16	.026
4	40	48	1/4	3/32	.074
5	40	44	5/16	7/64	.138
6	32★	40	5/16	7/64	.135
8	32★	36	11/32	1/8	.181
10	24★	32	3/8	1/8	.213
12	24	28	7/16	5/32	.370
1/4	20★	28	7/16	3/16	.413
5/16	18★	24	9/16	7/32	.800
3/8	16★	24	5/8	1/4	1.07

1. All threads are Class 2 free fit.
2. Packed in bulk or boxed 1 gross per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Items marked "★" are normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



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Lag Bolts

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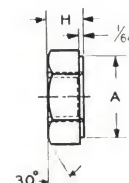
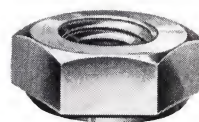
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ALCOA

HEXAGON MACHINE SCREW NUTS

Chamfered and Washer Faced
Bright Finish—Milled from Bar



ALCOA 24S-T4 ALLOY

(Army-Navy Aircraft Standards
AN340 and AN345)

DIMENSIONS IN INCHES

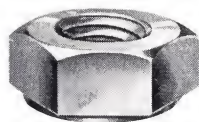
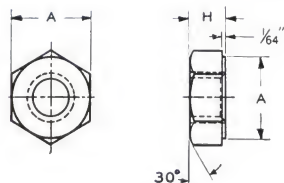
Nominal Size	Threads Per Inch		AN Drawing Dash No.	Width Across Flats A	Thickness H	Weight (Lbs.) Per Gross
	Coarse AN340	Fine AN345				
2	56	6.4	DD2	3/16	1/16	.022
3	48	56	DD3	3/16	1/16	.021
4	40★	48	DD4	1/4	3/32	.061
5	40★	44	DD5	5/16	7/64	.116
6	32★	40★	DD6	5/16	7/64	.113
8	32★	36★	DD8	11/32	1/8	.151
10	24★	32★	DD10	3/8	1/8	.176
1 1/4	20★	28	DD416	7/16	3/16	.337
5/16	18★	24	DD516	9/16	7/32	.662
3/8	16★	24	DD616	5/8	1/4	.890

1. All threads are Class 2 free fit.
2. Items marked "★" are normally carried in stock by Alcoa.
3. Packed in bulk or boxed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.



HEXAGON AIRCRAFT PLAIN NUTS

Chamfered and Washer Faced
Bright Finish*—Milled from Bar



ALCOA 24S-T4 ALLOY

DIMENSIONS IN INCHES

(Army-Navy Aircraft Standard AN315)

Nominal Size	Threads Per Inch Fine	AN Drawing Dash No.	Width Across Flats A	Thickness H	Weight (Lbs.) Per 100 Pieces
6	40★	D640R	5/16	7/64	.079
10	32★	D3R	3/8	9/64	.139
1/4	28★	D4R	7/16	3/16	.234
5/16	24★	D5R	1/2	15/64	.356
3/8	24★	D6R	9/16	9/32	.503
7/16	20★	D7R	5/8	21/64	.687
1/2	20★	D8R	3/4	3/8	1.18
9/16	18★	D9R	7/8	27/64	1.88
5/8	18★	D10R	1	15/32	2.79
3/4	16★	D12R	1-1/8	5/8	4.39
7/8	14	D14R	1-5/16	21/32	6.27
1	14	D16R	1-1/2	3/4	9.30
1-1/8	12	D18R	1-11/16	13/16	12.8
1-1/4	12	D20R	1-7/8	7/8	16.9

1. All threads are Class 3 medium fit.
2. Items marked "★" are normally carried in stock by Alcoa.
3. Packed in bulk or boxed 100 per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Nuts with coarse pitch threads can be made on special order.
6. *Nuts 7/8" and larger are furnished in machine finish.

Machine
Screws

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Wood
Screws,
Lag Bolts

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Metal
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ALCOA

HEXAGON AIRCRAFT JAM NUTS

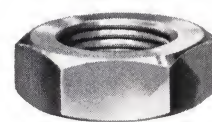
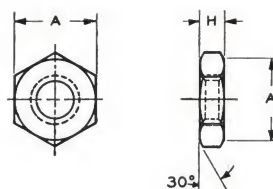
(CHECK NUTS)

Chamfered—Top and Bottom
Bright Finish*—Milled from Bar

ALCOA 24S-T4 ALLOY

(Army-Navy Aircraft Standard AN316)

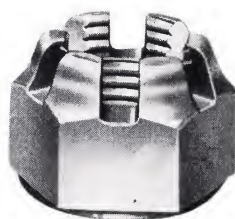
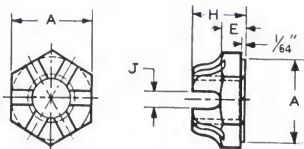
DIMENSIONS IN INCHES



Nominal Size	Threads Per Inch Fine	AN Drawing Dash No.	Width Across Flats A	Thickness H	Weight (Lbs.) Per 100 Pieces
1/4	28★	D4R	7/16	1/8	.157
5/16	24★	D5R	1/2	5/32	.239
3/8	24★	D6R	9/16	3/16	.337
7/16	20★	D7R	5/8	7/32	.461
1/2	20★	D8R	3/4	1/4	.792
9/16	18★	D9R	7/8	9/32	1.26
5/8	18★	D10R	1	5/16	1.87
3/4	16★	D12R	1-1/8	3/8	2.65
7/8	14	D14R	1-5/16	7/16	4.19
1	14	D16R	1-1/2	1/2	6.21

1. All threads are Class 3 medium fit.
2. Packed in bulk or boxed 100 per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Nuts with coarse pitch threads can be made on special order.
5. Items marked "★" are normally carried in stock by Alcoa.
6. *Nuts 7/8" and larger are furnished in machine finish.





ALCOA HEXAGON AIRCRAFT CASTLE NUTS

Washer Faced
Bright Finish—Milled from Bar

ALCOA 24S-T4 ALLOY

(Army-Navy Aircraft Standard AN310)

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch Fine	AN Drawing Dash No.	Width Across Flats A	Thickness H	Width of Slot J	Distance Slot To Washer Face E	Weight (Lbs.) Per 100 Pieces
10	32★	D3	3/8	1/4	5/64	7/64	.16
1/4	28★	D4	7/16	9/32	5/64	1/8	.25
5/16	24★	D5	1/2	21/64	5/64	11/64	.39
3/8	24★	D6	9/16	13/32	1/8	7/32	.45
7/16	20★	D7	5/8	29/64	1/8	17/64	.73
1/2	20★	D8	3/4	9/16	1/8	23/64	1.47
9/16	18★	D9	7/8	39/64	5/32	25/64	2.22
5/8	18★	D10	1	23/32	5/32	15/32	3.59
3/4	16★	D12	1-1/8	13/16	5/32	9/16	4.97
7/8	14	D14	1-5/16	29/32	5/32	21/32	7.75
1	14	D16	1-1/2	1	5/32	3/4	11.3
1-1/8	12	D18	1-11/16	1-5/32	5/32	13/16	16.5
1-1/4	12	D20	1-7/8	1-1/4	5/32	7/8	22.0

1. All threads are Class 3 medium fit.
2. Packed in bulk or boxed 100 per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Nuts with coarse pitch threads can be made on special order.
5. Items marked "★" are normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



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ALCOA

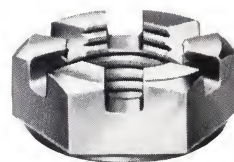
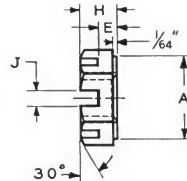
HEXAGON AIRCRAFT SHEAR NUTS

Chamfered and Washer Faced
Bright Finish—Milled from Bar

ALCOA 24S-T4 ALLOY

(Army-Navy Aircraft Standard AN320)

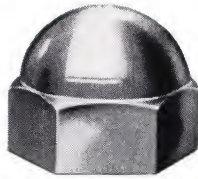
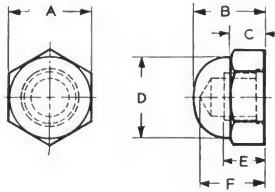
DIMENSIONS IN INCHES



Nominal Size	Threads Per Inch Fine	AN Drawing Dash No.	Width Across Flats A	Thickness H	Width of Slot J	Distance Slot to Washer Face E	Weight (Lbs.) Per 100 Pieces
6	40	D1	5/16	5/32	5/64	5/64	.078
8	36	D2	11/32	5/32	5/64	5/64	.097
10	32★	D3	3/8	3/16	5/64	3/32	.140
1/4	28★	D4	7/16	3/16	5/64	3/32	.187
5/16	24★	D5	1/2	3/16	5/64	3/32	.237
3/8	24★	D6	9/16	7/32	1/8	7/64	.301
7/16	20★	D7	3/8	7/32	1/8	7/64	.365
1/2	20★	D8	3/4	1/4	1/8	9/64	.669
9/16	18★	D9	7/8	5/16	5/32	3/16	1.18
5/8	18★	D10	1	5/16	5/32	3/16	1.61
3/4	16★	D12	1-1/8	3/8	5/32	1/4	2.38
7/8	14	D14	1-5/16	7/16	5/32	5/16	3.89
1	14	D16	1-1/2	1/2	5/32	3/8	5.80
1-1/8	12	D18	1-11/16	9/16	5/32	13/32	8.37
1-1/4	12	D20	1-7/8	5/8	5/32	15/32	11.5

1. All threads are Class 3 medium fit.
2. Packed in bulk or boxed 100 per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Nuts with coarse pitch threads can be made on special order.
5. Items marked "★" are normally carried in stock by Alcoa.





ALCOA

CAP NUTS (ACORN NUTS)

Bright Finish
Milled from Bar

DIMENSIONS IN INCHES

ALCOA 24S-T4 ALLOY

Nominal Size	Threads Per Inch		Hex Size A	Nut Height B	Hex Height C	Dome Diameter D	Tap Depth (Usable Thread) E	Drill Depth F	Weight (Lbs.) Per 100 Pieces
	Coarse	Fine							
6	32★	40	5/16	9/32	5/32	.303	3/16	1/4	.17
8	32★	36	5/16	9/32	5/32	.303	3/16	1/4	.16
10	24★	32★	3/8	11/32	11/64	.359	7/32	5/16	.28
1/4	20★	28	7/16	3/8	3/16	.422	7/32	11/32	.39
5/16	18★	24	9/16	7/16	7/32	.531	9/32	13/32	.71
3/8	16★	24	5/8	1/2	1/4	.594	5/16	7/16	.95
7/16	14	20	3/4	9/16	9/32	.719	9/32	15/32	1.65
1/2	13	20	3/4	9/16	9/32	.719	9/32	15/32	1.53
5/8	11	18	15/16	3/4	3/8	.906	7/16	21/32	3.12

1. All threads are Class 2 free fit.
2. Items marked "★" are normally carried in stock by Alcoa.
3. Packed in bulk or boxed one hundred pieces per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.

ALUMINUM COMPANY OF AMERICA



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Screws

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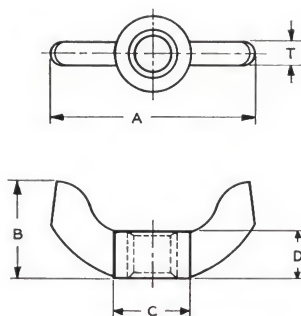
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ALCOA

WING NUTS

Bright Finish



ALCOA 24S-T4 ALLOY

DIMENSIONS IN INCHES

Blank Size	Thread Size	Wing Spread A	Total Height B	Base Diameter C	Base Height D	Wing Thickness T	Weight (Lbs.) Per 100 Pieces
0	6-32★	11/16	21/64	9/32	5/32	1/16	.134
	8-32★						.127
1	10-24★	1	15/32	3/8	7/32	3/32	.330
	10-32★						.330
	12-24★						.320
2	1/4-20★	1-1/16	33/64	13/32	1/4	1/8	.430
3	5/16-18★	1-5/16	5/8	1/2	9/32	1/8	.750
4	3/8-16★	1-37/64	49/64	5/8	23/64	5/32	1.46

1. All threads are Class 2 free fit.
2. Packed in bulk or boxed 100 pieces per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Items marked "★" are normally carried in stock by Alcoa.
5. Blanks can also be tapped with other threads on special order.

SECTION

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MACHINE SCREWS

SLOTTED AND PHILLIPS RECESSED

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Machine
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MACHINE SCREWS

Alcoa aluminum machine screws are furnished with slotted or Phillips recessed heads in all of the common head types and also in two special head styles which are not usually supplied in other materials. One of these is the Jackson Head which is an undersize oval countersunk head used primarily for architectural applications where the smaller head has a more desirable appearance. Another, the Alcoa Finishing Head machine screw, has been specially designed to permit an invisible flush type fastening for ornamental and architectural work. This screw has the standard flat countersunk head with a raised rectangular key which is sheared off after the screw is driven. The screw head and surrounding surface can then be ground and polished so that the presence of the screw is practically indiscernible.

Machine screws in the usual size range are produced from upset blanks. Threads are rolled on screws up to 2" in length; longer length screws usually have cut threads but thread rolling may be resorted to in special cases.

Alcoa machine screws can be substituted for screws made of other materials in many applications and will result in improved appearance and superior resistance to corrosion including elimination of unsightly streaking of adjacent surfaces by rust stains. The use of Alcoa aluminum screws in assemblies of aluminum parts is of prime importance to avoid any possibility of galvanic corrosion and to provide a pleasing uniform appearance which will last for the life of the assembly.

Where Alcoa Aluminum machine screws are used with nuts, the proper size and type of Alcoa machine screw nut should be specified. These nuts are machined to provide ease of assembly and trouble free service. Frequently machine screws are used in tapped holes of component parts of an assembly and sometimes in architectural work holes are drilled and tapped at the erection site. In such cases it is important that a clean, accurately tapped hole of the correct size be provided in proper alignment with clearance holes in adjacent members. Such precautions will insure ease of driving and will permit the maximum percentage of torque to be utilized in securing a tight joint. One of the most common errors in tapping procedure is the use of an undersize tap drill. This practice makes the tapping operation more difficult and often results in an undersize tapped hole with ragged threads which prevent free turning of the screw. Table No. 13 on page 229 lists standard drill sizes for all common sizes of tapped holes together with the resulting percentage of thread depth. Drills giving greater than 75% of the thread depth should be avoided where free assembly is required. Tests have shown that drill sizes giving as low as 65% of full thread depth result in only a negligible decrease in theoretical strength, and give added protection against so called seizing of the screw in the tapped hole. In many instances a drop of lubricant such as ordinary engine oil on the screw threads will speed up assembly especially if the tapped hole is not of the best quality.



Wood
Screws,
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ALCOA

ROUND HEAD MACHINE SCREWS

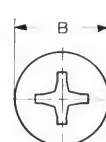
Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)



Slotted Head

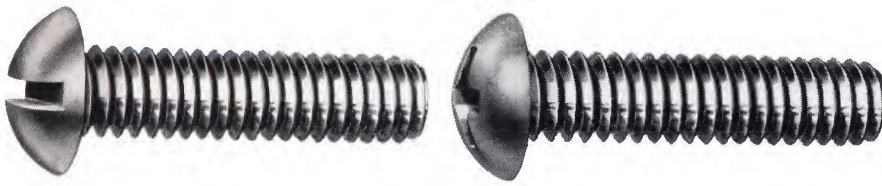


Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
	Coarse	Fine							
2 .086	2-56	2-64	.162 .146	.069 .059	.031 .023	.048 .037	.097 .087	.071 .061	1
3 .099	3-48	3-56	.187 .169	.078 .067	.035 .027	.053 .040	.106 .096	.080 .070	1
4 .112	4-40	4-48	.211 .193	.086 .075	.039 .031	.058 .044	.115 .105	.090 .080	1
5 .125	5-40	5-44	.236 .217	.095 .083	.043 .035	.062 .047	.151 .141	.104 .094	2
6 .138	6-32	6-40	.260 .240	.103 .091	.048 .039	.068 .051	.159 .149	.112 .102	2
8 .164	8-32	8-36	.309 .287	.119 .107	.054 .045	.076 .058	.175 .165	.128 .118	2
10 .190	10-24	10-32	.359 .334	.136 .124	.060 .050	.086 .065	.192 .182	.145 .135	2
12 .216	12-24	12-28	.408 .382	.153 .139	.067 .056	.096 .072	.246 .236	.165 .155	3
1/4 .250	1/4-20	1/4-28	.472 .443	.174 .161	.075 .064	.108 .082	.265 .255	.187 .177	3
5/16 .3125	5/16-18	5/16-24	.590 .557	.214 .200	.084 .072	.130 .099	.305 .295	.227 .217	3
3/8 .375	3/8-16	3/8-24	.708 .670	.254 .239	.094 .081	.153 .117	.384 .374	.281 .271	4

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Coarse thread screws conform to Army-Navy Aircraft Standard AN515.
Fine thread screws conform to Army-Navy Aircraft Standard AN520.



ALCOA

ROUND HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

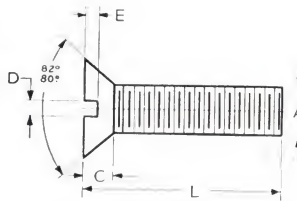
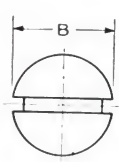
Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.021	.029	.038	.052	.065⊖	.103⊖				
1/4	.025	.034	.045	.060	.074★	.117★	.168⊖			
5/16	.029	.039	.051	.068	.084★	.132★	.186★	.398	.714	
3/8	.033	.044	.058	.076	.094★	.146★	.205★	.432★	.767⊖	1.24
7/16	.036	.050	.064	.085	.104★	.161★	.224★	.465★	.821	1.32
1/2	.040	.055	.071	.093	.113★	.175★	.242★	.498★	.874★	1.39⊖
9/16	.044	.060	.077	.101	.123	.190	.261	.531	.927	1.47
5/8	.048	.065	.084	.110	.133★	.204★	.280★	.564★	.981★	1.55⊖
11/16	.052	.070	.090	.118	.143	.219	.299	.598	1.03	1.63
3/4	.056	.075	.096	.126	.152★	.233★	.317★	.631★	1.09 ★	1.71★
7/8	....	.086	.109	.143	.172★	.262★	.355★	.697★	1.19 ★	1.86★
1	....	.096	.122	.160	.191★	.291★	.392★	.764★	1.30 ★	2.02★
1-1/8	....	....	.135	.176	.211★	.321★	.430★	.830	1.41	2.18
1-1/4	....	....	.148	.193	.230★	.350★	.467★	.897★	1.51 ★	2.33★
1-1/2	....	....	.174	.226	.269⊖	.408★	.542★	1.03 ★	1.73 ★	2.65★
1-3/4	....	....	....	.259	.308⊖	.466⊖	.617★	1.16 ★	1.94 ★	2.96
2	....	....	....	....	.347⊖	.524⊖	.691★	1.30 ★	2.15 ★	3.27★
2-1/4	....	....	....	....	.412	.613	.815	1.51	2.49	3.74
2-1/2	....	....	....	....	.463	.686	.914	1.68	2.76	4.13
2-3/4	....	....	....	....	.515	.759	1.01	1.85	3.03	4.53
3	....	....	....	....	.....	.833	1.11	2.03	3.30	4.92

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
- Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
- 10-32 screws are stocked in the same sizes as 10-24 with slotted and Phillips heads.

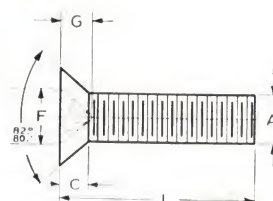
ALCOA

FLAT HEAD MACHINE SCREWS

Bright Finish



Slotted Head



Phillips Recessed Head

ALCOA 24S-T4 ALLOY
(American Standard B18.6)

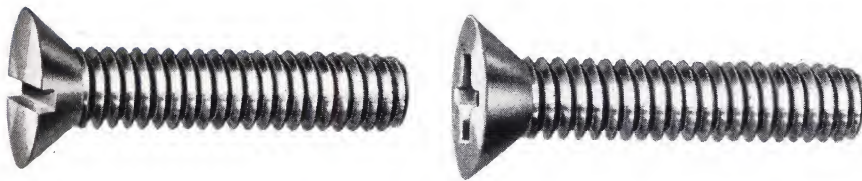
DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
	Coarse	Fine							
2 .086	2-56	2-64	.172 .156	.051 .040	.031 .023	.023 .015	.099 .089	.060 .050	1
3 .099	3-48	3-56	.199 .181	.059 .048	.035 .027	.027 .017	.104 .094	.065 .055	1
4 .112	4-40	4-48	.225 .207	.067 .055	.039 .031	.030 .020	.125 .115	.086 .076	1
5 .125	5-40	5-44	.252 .232	.075 .062	.043 .035	.034 .022	.151 .141	.083 .073	2
6 .138	6-32	6-40	.279 .257	.083 .069	.048 .039	.038 .024	.171 .161	.103 .093	2
8 .164	8-32	8-36	.332 .308	.100 .084	.054 .045	.045 .029	.186 .176	.118 .108	2
10 .190	10-24	10-32	.385 .359	.116 .098	.060 .050	.053 .034	.201 .191	.133 .123	2
12 .216	12-24	12-28	.438 .410	.132 .112	.067 .056	.060 .039	.265 .255	.153 .143	3
1/4 .250	1/4-20	1/4-28	.507 .477	.153 .131	.075 .064	.070 .046	.280 .270	.168 .158	3
5/16 .3125	5/16-18	5/16-24	.635 .600	.191 .165	.084 .072	.088 .058	.362 .352	.213 .203	4
3/8 .375	3/8-16	3/8-24	.762 .722	.230 .200	.094 .081	.106 .070	.390 .380	.242 .232	4

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Coarse thread screws conform to Army-Navy Aircraft Standard AN505.
Fine thread screws conform to Army-Navy Aircraft Standard AN510.
6. Short length flat head screws with a length equal to or less than the list below have undercut heads, with the conical bearing surface approximately two-thirds of the standard height, with slot depths and recess dimensions proportionately less but with standard head diameters.

Screw Size	Screw Length Equal to or Less Than	Screw Size	Screw Length Equal to or Less Than	Screw Size	Screw Length Equal to or Less Than
2	1/8	6	3/16	1/4	7/16
3	1/8	8	1/4	5/16	1/2
4	3/16	10	5/16	3/8	9/16
5	3/16	12	3/8		





ALCOA

FLAT HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1 1/4-20	5 16-18	3 8-16
3/16	.015	.021	.028	.037	.046					
1/4	.019	.027	.035	.046	.056★	.088★	.122⊖			
5/16	.023	.032	.041	.054	.066★	.102★	.141★	.276	.489	
3/8	.027	.037	.047	.062	.075★	.117★	.160★	.310★	.542	.863
7/16	.031	.042	.054	.071	.085★	.131★	.178	.343	.596	.941
1/2	.035	.047	.060	.079	.095★	.146★	.197★	.376★	.649★	1.02⊖
9/16	.039	.052	.067	.087	.105	.160	.216	.409	.702	1.10
5/8	.043	.058	.073	.095	.114★	.175★	.235★	.443★	.756★	1.18⊖
11/16	.047	.063	.080	.104	.124	.190	.253	.476	.809	1.25
3/4	.051	.068	.086	.112	.134★	.204★	.272★	.509★	.862★	1.33★
7/8	....	.078	.099	.129	.153★	.233★	.309★	.575★	.969	1.49★
1	....	.088	.112	.145	.173★	.262★	.347★	.642★	1.08★	1.65★
1-1/8	....	....	.125	.162	.192	.291	.384	.708	1.18	1.80
1-1/4	....	....	.137	.179	.212★	.320★	.422★	.775★	1.29★	1.96★
1-1/2	....	....	.163	.212	.251⊖	.378★	.497★	.908★	1.50★	2.27★
1-3/4	....	....	....	....	.290⊖	.437⊖	.571★	1.04★	1.72	2.58
2	....	....	....	....	.329⊖	.495⊖	.646★	1.17★	1.93★	2.90★
2-1/4	....	....	....	....	.389	.578	.759	1.36	2.22	3.30
2-1/2	....	....	....	....	.441	.651	.859	1.54	2.49	3.69
2-3/4	....	....	....	....	.493	.724	.958	1.71	2.76	4.08
3	....	....	....	....	....	.798	1.06	1.88	3.03	4.47

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
- Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
- Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
- 10-32 screws are stocked in the same sizes as 10-24 with slotted and Phillips heads.



Wood
Screws,
Lag Bolts

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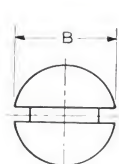
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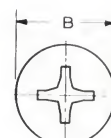
ALCOA

OVAL HEAD MACHINE SCREWS

Bright Finish



Slotted Head



Phillips Recessed Head

ALCOA 24S-T4 ALLOY
(American Standard B18.6)

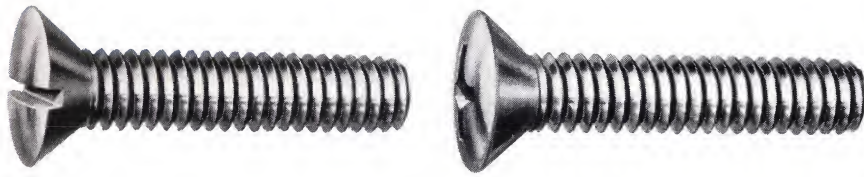
DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter	Head Height	Width of Slot	Depth of Slot	Diameter of Recess	Depth of Recess	Oval Height	Phillips Head Driver Size No.
	Coarse	Fine	B	C	D	E	F	G	J	
2 .086	2-56	2-64	.172 .156	.051 .040	.031 .023	.045 .037	.109 .099	.078 .068	.029 .023	1
3 .099	3-48	3-56	.199 .181	.059 .048	.035 .027	.052 .043	.121 .111	.090 .080	.033 .025	1
4 .112	4-40	4-48	.225 .207	.067 .055	.039 .031	.059 .049	.133 .123	.103 .093	.037 .029	1
5 .125	5-40	5-44	.252 .232	.075 .062	.043 .035	.067 .055	.155 .145	.098 .088	.041 .033	2
6 .138	6-32	6-40	.279 .257	.083 .069	.048 .039	.074 .060	.175 .165	.119 .109	.045 .036	2
8 .164	8-32	8-36	.332 .308	.100 .084	.054 .045	.088 .072	.189 .179	.133 .123	.052 .042	2
10 .190	10-24	10-32	.385 .359	.116 .098	.060 .050	.103 .084	.206 .196	.151 .141	.060 .050	2
12 .216	12-24	12-28	.438 .410	.132 .112	.067 .056	.117 .096	.267 .257	.174 .164	.068 .057	3
1/4 .250	1/4-20	1/4-28	.507 .477	.153 .131	.075 .064	.136 .112	.287 .277	.194 .184	.079 .066	3
5/16 .3125	5/16-18	5/16-24	.635 .600	.191 .165	.084 .072	.171 .141	.387 .377	.266 .256	.099 .084	4
3/8 .375	3/8-16	3/8-24	.762 .722	.230 .200	.094 .081	.206 .170	.407 .397	.285 .275	.117 .100	4

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.
5. Short length oval head screws with a length equal to or less than the list below have undercut heads, with the conical bearing surface approximately two-thirds of the standard height, with slot depths and recess dimensions proportionately less but with standard head diameters.

Screw Size	Screw Length Equal to or Less Than	Screw Size	Screw Length Equal to or Less Than	Screw Size	Screw Length Equal to or Less Than
2	1/8	6	3/16	1/4	7/16
3	1/8	8	1/4	5/16	1/2
4	3/16	10	5/16	3/8	9/16
5	3/16	12	3/8		





ALCOA

OVAL HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.018	.026	.035	.047	.059	.095	.138			
1/4	.022	.031	.041	.056	.069★	.110★	.157⊖			
5/16	.026	.037	.048	.064	.079★	.124★	.176★	.357	.652	
3/8	.030	.042	.054	.072	.088★	.139★	.195★	.390★	.705	1.15
7/16	.034	.047	.061	.081	.098★	.153★	.213	.423	.758	1.23
1/2	.038	.052	.067	.089	.108★	.168★	.232★	.457★	.812	1.30
9/16	.042	.057	.074	.097	.118	.182	.251	.490	.865	1.38
5/8	.046	.062	.080	.106	.127★	.197★	.269★	.523★	.918	1.46
11/16	.050	.067	.086	.114	.137	.212	.288	.556	.972	1.54
3/4	.054	.073	.093	.122	.147★	.226★	.307★	.589★	1.03	1.62
7/8	....	.083	.106	.139	.166	.255	.344	.656	1.13	1.77
1	....	.093	.119	.155	.186★	.284★	.382★	.722★	1.24	1.93
1-1/8	....	....	.132	.172	.205	.313	.419	.789	1.35	2.09
1-1/4	....	....	.144	.189	.225★	.342★	.457★	.855★	1.45	2.24
1-1/2	....	....	.170	.222	.264⊖	.401★	.531★	.988★	1.67	2.56
1-3/4	....	....	....	.255	.303	.459⊖	.606★	1.12 ★	1.88	2.87
2	....	....	....	....	.342	.517⊖	.681★	1.25 ★	2.09	3.18
2-1/4	....	....	....	....	.402	.600	.794	1.44	2.38	3.58
2-1/2	....	....	....	....	.454	.673	.894	1.62	2.65	3.98
2-3/4	....	....	....	....	.505	.746	.993	1.79	2.93	4.37
3	....	....	....	....	....	.820	1.09	1.96	3.20	4.76

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
- Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.



Wood
Screws,
Lag Bolts

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Sheet
Metal
Screws

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Washers

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Rivets and
Nails

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Misc.
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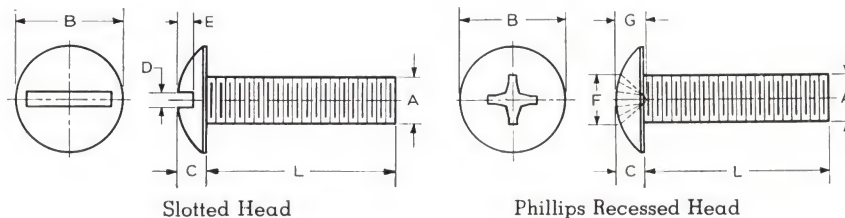
ALCOA

TRUSS HEAD MACHINE SCREWS

Bright Finish

ALCOA 245-T4 ALLOY

(American Standard B18.6)



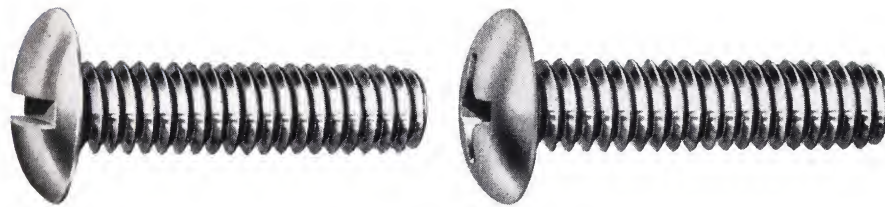
DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
	Coarse	Fine							
2 .086	2-56	2-64	.194 .180	.053 .044	.031 .023	.031 .022	.101 .091	.071 .061	1
3 .099	3-48	3-56	.226 .211	.061 .051	.035 .027	.036 .026	.109 .099	.080 .070	1
4 .112	4-40	4-48	.257 .241	.069 .059	.039 .031	.040 .030	.109 .099	.078 .068	1
5 .125	5-40	5-44	.289 .272	.078 .066	.043 .035	.045 .034	.125 .115	.095 .085	1
6 .138	6-32	6-40	.321 .303	.086 .074	.048 .039	.049 .037	.155 .145	.100 .090	2
8 .164	8-32	8-36	.384 .364	.102 .088	.054 .045	.058 .045	.170 .160	.115 .105	2
10 .190	10-24	10-32	.447 .425	.118 .103	.060 .050	.068 .053	.185 .175	.131 .121	2
12 .216	12-24	12-28	.511 .487	.134 .118	.067 .056	.077 .061	.245 .235	.155 .145	3
1/4 .250	1/4-20	1/4-28	.572 .546	.150 .133	.075 .064	.087 .070	.260 .250	.170 .160	3
5/16 .3125	5/16-18	5/16-24	.698 .666	.183 .162	.084 .072	.106 .085	.349 .339	.234 .224	4
3/8 .375	3/8-16	3/8-24	.823 .787	.215 .191	.094 .081	.124 .100	.380 .370	.266 .256	4

1. This head type is sometimes called button head, oven head, or stove head.
2. All threads are Class 2 free fit.
3. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
4. Shipped in bulk or packed 1 gross per box.
5. These screws conform to Army Navy Aircraft Standard AN526 for those sizes covered by this standard.
6. Will be furnished with Alcoa's Alumilite finish, if specified.

ALCOA

TRUSS HEAD MACHINE SCREWS



WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.022	.032	.044	.060	.076	.125	.185			
1/4	.026	.037	.051	.068	.086⊖	.140⊖	.204⊖	.400		
5/16	.030	.042	.057	.076	.096	.154	.222	.433		
3/8	.034	.048	.063	.085	.106⊖	.169⊖	.241⊖	.466	.806	1.26
7/16	.038	.053	.070	.093	.115⊖	.183⊖	.260⊖	.500	.859	1.34
1/2	.042	.058	.076	.101	.125⊖	.198⊖	.278⊖	.533	.913	1.42
9/16	.046	.063	.083	.110	.135	.212	.297	.566	.966	1.49
5/8	.050	.068	.089	.118	.145⊖	.227⊖	.316⊖	.599	1.02	1.57
11/16	.054	.073	.096	.126	.154	.242	.335	.632	1.07	1.65
3/4	.058	.079	.102	.135	.164⊖	.256⊖	.353⊖	.666	1.13	1.73
7/8	....	.089	.115	.151	.184⊖	.285⊖	.391⊖	.732	1.23	1.89
1	....	.099	.128	.168	.203⊖	.314⊖	.428⊖	.799	1.34	2.04
1-1/8	....	....	.141	.184	.223	.343	.466	.865	1.45	2.20
1-1/4	....	....	.153	.201	.242⊖	.372⊖	.503⊖	.931	1.55	2.35
1-1/2	....	....	.179	.234	.281	.430	.578	1.06	1.77	2.67
1-3/4	....	....	....	.267	.320	.488	.653	1.20	1.98	2.98
2	....	....	....	....	.359	.547	.727	1.33	2.19	3.29
2-1/4	....	....	....	....	.423	.635	.851	1.54	2.52	3.76
2-1/2	....	....	....	....	.475	.709	.950	1.72	2.80	4.16
2-3/4	....	....	....	....	.527	.782	1.05	1.89	3.07	4.55
3	....	....	....	....	.578	.855	1.15	2.06	3.34	4.94

1. Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
2. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
3. Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
4. 10-32 screws are stocked in the same sizes as 10-24.

ALUMINUM COMPANY OF AMERICA



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Wood
Screws,
Lag Bolts

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Sheet
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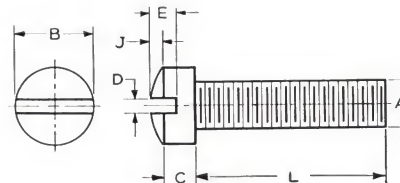
ALCOA

FILLISTER HEAD MACHINE SCREWS

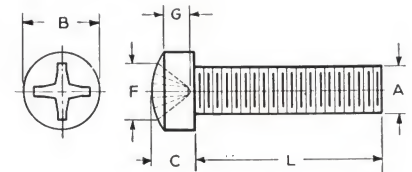
Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)



Slotted Head



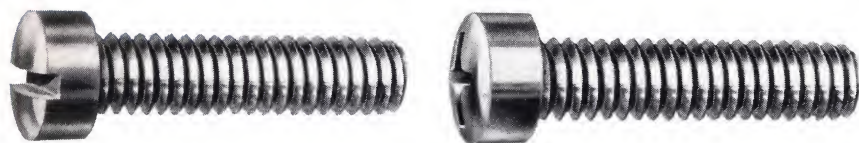
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter	Head Height	Width of Slot	Depth of Slot	Diameter of Recess	Depth of Recess	Oval Height	Phillips Head Driver Size No.
	Coarse	Fine	B	C	D	E	F	G	J	
2 .086	2-56	2-64	.140	.062	.031	.037	.103	.076	.021	1
			.124	.053	.023	.025	.093	.066	.013	
3 .099	3-48	3-56	.161	.070	.035	.043	.113	.087	.025	1
			.145	.061	.027	.030	.103	.077	.016	
4 .112	4-40	4-48	.183	.079	.039	.048	.125	.099	.028	1
			.166	.069	.031	.035	.115	.089	.019	
5 .125	5-40	5-44	.205	.088	.043	.054	.158	.109	.032	2
			.187	.078	.035	.040	.148	.099	.022	
6 .138	6-32	6-40	.226	.096	.048	.060	.169	.121	.036	2
			.208	.086	.039	.045	.159	.111	.025	
8 .164	8-32	8-36	.270	.113	.054	.071	.191	.144	.043	2
			.250	.102	.045	.054	.181	.134	.031	
10 .190	10-24	10-32	.313	.130	.060	.083	.213	.167	.050	2
			.292	.118	.050	.064	.203	.157	.038	
12 .216	12-24	12-28	.357	.148	.067	.094	.271	.191	.057	3
			.334	.134	.056	.074	.261	.181	.044	
1/4 .250	1/4-20	1/4-28	.414	.170	.075	.109	.299	.220	.067	3
			.389	.155	.064	.087	.289	.210	.052	
5/16 .3125	5/16-18	5/16-24	.518	.211	.084	.137	.352	.276	.084	3
			.490	.194	.072	.110	.342	.266	.068	
3/8 .375	3/8-16	3/8-24	.622	.253	.094	.164	.434	.331	.102	4
			.590	.233	.081	.133	.424	.321	.082	

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.





ALCOA

FILLISTER HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.023	.034	.046	.063	.080	.131	.194			
1/4	.027	.039	.052	.071	.090	.145	.212			
5/16	.031	.044	.059	.079	.100	.160	.231	.486	.904	
3/8	.035	.049	.065	.088	.109	.174	.250	.519	.957	1.59
7/16	.039	.054	.072	.096	.119	.189	.268	.552	1.01	1.67
1/2	.043	.059	.078	.104	.129	.203	.287	.586	1.06	1.75
9/16	.047	.064	.085	.113	.139	.218	.306	.619	1.12	1.83
5/8	.051	.070	.091	.121	.148	.232	.325	.652	1.17	1.90
11/16	.055	.075	.097	.129	.158	.247	.343	.685	1.22	1.98
3/4	.059	.080	.104	.137	.168	.262	.362	.719	1.28	2.06
7/8	....	.090	.117	.154	.187	.291	.399	.785	1.38	2.22
1	....	.101	.130	.171	.207	.320	.437	.852	1.49	2.37
1-1/8	....	....	.142	.187	.226	.349	.474	.918	1.60	2.53
1-1/4	....	....	.155	.204	.246	.378	.512	.984	1.70	2.69
1-1/2	....	....	.181	.237	.285	.436	.587	1.12	1.92	3.00
1-3/4	....	....	....	.270	.324	.494	.661	1.25	2.13	3.31
2	....	....	....	....	.363	.552	.736	1.38	2.34	3.63
2-1/4	....	....	....	....	.427	.641	.860	1.60	2.68	4.10
2-1/2	....	....	....	....	.479	.714	.959	1.77	2.95	4.49
2-3/4	....	....	....	....	.530	.788	1.06	1.94	3.22	4.88
3	....	....	....	....	....	.861	1.16	2.11	3.49	5.27

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
3. Fillister Head Screws are not normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



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Wood
Screws,
Lag Bolts

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Sheet
Metal
Screws

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Washers

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Rivets and
Nails

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Misc.
Fasteners
Accessories

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Design
Information
and Tables

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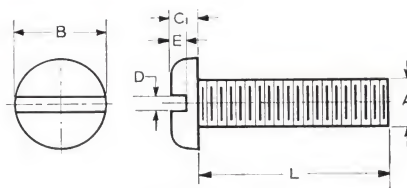
ALCOA

PAN HEAD (BINDING HEAD)

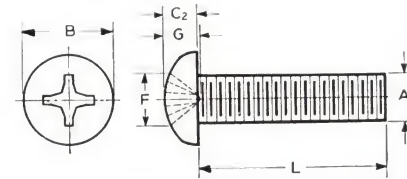
MACHINE SCREWS

Bright Finish

ALCOA 24S-T4 ALLOY
(American Standard B18.6)



Slotted Head



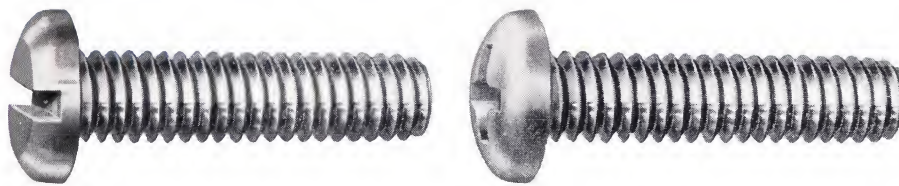
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height (Slotted) C ₁	Head Height (Phillips) C ₂	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
	Coarse	Fine								
2 .086	2-56	2-64	.167 .155	.053 .045	.062 .053	.031 .023	.033 .023	.101 .091	.071 .061	1
3 .099	3-48	3-56	.193 .180	.060 .051	.071 .062	.035 .027	.037 .027	.109 .099	.080 .070	1
4 .112	4-40	4-48	.219 .205	.068 .058	.080 .070	.039 .031	.041 .030	.119 .109	.090 .080	1
5 .125	5-40	5-44	.245 .231	.075 .065	.089 .079	.043 .035	.045 .032	.155 .145	.103 .093	2
6 .138	6-32	6-40	.270 .256	.082 .072	.097 .087	.048 .039	.050 .038	.163 .153	.111 .101	2
8 .164	8-32	8-36	.322 .306	.096 .085	.115 .105	.054 .045	.058 .043	.179 .169	.127 .117	2
10 .190	10-24	10-32	.373 .357	.110 .099	.133 .122	.060 .050	.067 .050	.196 .186	.145 .135	2
12 .216	12-24	12-28	.425 .407	.125 .112	.151 .139	.067 .056	.077 .060	.256 .246	.171 .161	3
1/4 .250	1/4-20	1/4-28	.492 .473	.144 .130	.175 .162	.075 .064	.087 .070	.278 .268	.192 .182	3
5/16 .3125	5/16-18	5/16-24	.615 .594	.178 .162	.218 .203	.084 .072	.109 .092	.347 .337	.227 .217	4
3/8 .375	3/8-16	3/8-24	.740 .716	.212 .195	.261 .244	.094 .081	.130 .113	.390 .380	.266 .256	4

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.





ALCOA

PAN HEAD (BINDING HEAD) MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.023	.033	.045	.061	.078					
1/4	.027	.038	.051	.069	.087	.141	.204			
5/16	.031	.043	.057	.077	.097	.155	.223	.459	.852	
3/8	.035	.048	.064	.086	.107	.170	.241	.492	.905	1.46
7/16	.039	.053	.070	.094	.116	.184	.260	.526	.958	1.54
1/2	.042	.058	.077	.102	.126	.199	.279	.559	1.01	1.62
9/16	.046	.064	.083	.111	.136	.213	.297	.592	1.07	1.70
5/8	.050	.069	.090	.119	.146	.228	.316	.625	1.12	1.77
11/16	.054	.074	.096	.127	.155	.242	.335	.659	1.17	1.85
3/4	.058	.079	.102	.136	.165	.257	.354	.692	1.23	1.93
7/8	....	.089	.115	.152	.185	.286	.391	.758	1.33	2.09
1	....	.100	.128	.169	.204	.315	.428	.825	1.44	2.24
1-1/8	....	....	.141	.185	.224	.344	.466	.891	1.55	2.40
1-1/4	....	....	.154	.202	.243	.373	.503	.958	1.65	2.56
1-1/2	....	....	.180	.235	.282	.431	.578	1.09	1.87	2.87
1-3/4	....	....	....	....	.321	.490	.653	1.22	2.08	3.18
2	....	....	....	....	.360	.548	.728	1.36	2.29	3.50
2-1/4	....	....	....	....	.424	.636	.851	1.57	2.62	3.97
2-1/2	....	....	....	....	.476	.710	.951	1.74	2.90	4.36
2-3/4	....	....	....	....	.528	.783	1.05	1.92	3.17	4.75
3	....	....	....	....	....	.856	1.15	2.09	3.44	5.14

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly greater.
2. Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.

ALUMINUM COMPANY OF AMERICA



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Wood
Screws,
Lag Bolts

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Sheet
Metal
Screws

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Washers

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Rivets and
Nails

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Misc.
Fasteners,
Accessories

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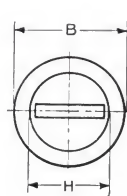
Design
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and Tables

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ALCOA

WASHER HEAD MACHINE SCREWS

Bright Finish



Slotted Head



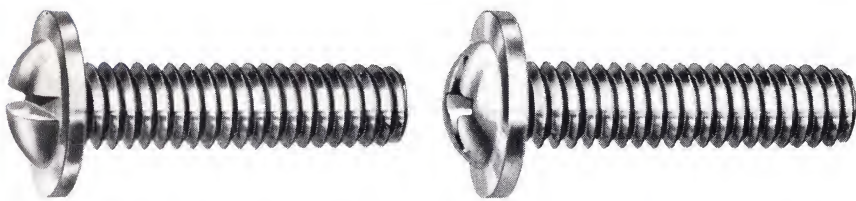
Phillips Recessed Head

ALCOA 245-T4 ALLOY

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Diam. of Recess F	Depth of Recess G	Crown Diam. H	Washer Thick- ness J	Phillips Head Driver Size No.
	Coarse	Fine									
2 .086	2-56	2-64	.201	.062	.031	.039	.102	.081	.144	.018	1
			.185	.051	.023	.029	.092	.071	.128	.012	
3 .099	3-48	3-56	.231	.070	.035	.043	.110	.089	.165	.020	1
			.213	.059	.027	.033	.100	.079	.147	.014	
4 .112	4-40	4-48	.261	.079	.039	.048	.119	.098	.186	.023	1
			.243	.068	.031	.036	.109	.088	.168	.017	
5 .125	5-40	5-44	.291	.088	.043	.053	.142	.097	.208	.025	2
			.271	.076	.035	.040	.132	.087	.188	.019	
6 .138	6-32	6-40	.321	.096	.048	.058	.148	.103	.228	.027	2
			.301	.084	.039	.043	.138	.093	.208	.021	
8 .164	8-32	8-36	.380	.113	.054	.067	.164	.119	.270	.032	2
			.358	.101	.045	.050	.154	.109	.248	.026	
10 .190	10-24	10-32	.439	.130	.060	.076	.180	.137	.312	.036	2
			.415	.118	.050	.057	.170	.127	.288	.030	
12 .216	12-24	12-28	.499	.147	.067	.090	.235	.160	.354	.041	3
			.473	.135	.056	.067	.225	.150	.328	.035	
1/4 .250	1/4-20	1/4-28	.577	.170	.075	.108	.251	.176	.410	.048	3
			.548	.157	.064	.080	.241	.166	.380	.040	
5/16 .3125	5/16-18	5/16-24	.721	.211	.084	.130	.295	.224	.511	.060	3
			.687	.197	.072	.097	.285	.214	.477	.051	
3/8 .375	3/8-16	3/8-24	.864	.254	.094	.153	.351	.251	.612	.071	4
			.826	.236	.081	.114	.341	.241	.574	.061	

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.



ALCOA

WASHER HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

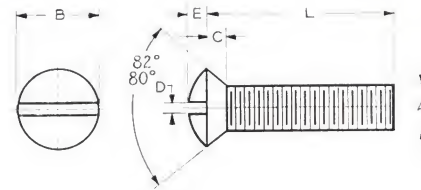
Length L Inches	Thread Size									
	2-56	3-48	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.022	.030	.042	.056	.071					
1/4	.026	.036	.048	.064	.080	.129	.184			
5/16	.030	.041	.055	.073	.090	.143	.203	.417	.767	
3/8	.034	.046	.061	.081	.100	.158	.222	.451	.821	1.34
7/16	.037	.051	.068	.089	.110	.173	.241	.484	.874	1.41
1/2	.041	.056	.074	.098	.119	.187	.259	.517	.927	1.49
9/16	.045	.061	.080	.106	.129	.202	.278	.550	.981	1.57
5/8	.049	.067	.087	.114	.139	.216	.297	.583	1.03	1.65
11/16	.053	.072	.093	.123	.149	.231	.315	.617	1.09	1.73
3/4	.057	.077	.100	.131	.158	.245	.334	.650	1.14	1.81
7/8	....	.087	.113	.147	.178	.274	.372	.716	1.25	1.96
1	....	.098	.126	.164	.197	.303	.409	.783	1.35	2.12
1-1/8	....	....	.138	.181	.217	.332	.446	.849	1.46	2.28
1-1/4	....	....	.151	.197	.236	.362	.484	.916	1.57	2.43
1-1/2	....	....	.177	.230	.275	.420	.559	1.05	1.78	2.74
1-3/4	....	....	....	....	.314	.478	.634	1.18	1.99	3.06
2	....	....	....	....	.353	.536	.708	1.31	2.21	3.37
2-1/4	....	....	....	....	.418	.625	.832	1.53	2.54	3.84
2-1/2	....	....	....	....	.469	.698	.931	1.70	2.81	4.23
2-3/4	....	....	....	....	.521	.771	1.03	1.87	3.08	4.62
3	....	....	....	....	....	.845	1.13	2.05	3.36	5.02

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
3. Washer Head Screws are not normally carried in stock by Alcoa.

ALCOA

JACKSON HEAD MACHINE SCREWS

Bright Finish



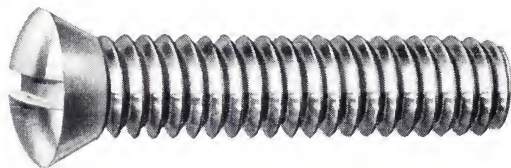
ALCOA 245-T4 ALLOY

DIMENSIONS IN INCHES

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height C	Width of Slot Nominal D	Slot Depth and Oval Height E
	Coarse	Fine				
4 .112	4-40	4-48	.165	.032	.019	.025
			.147	.019		.018
6 .138	6-32	6-40	.201	.038	.028	.036
			.179	.022		.028
8 .164	8-32	8-36	.252	.053	.028	.053
			.228	.037		.043
10 .190	10-24	10-32	.294	.062	.037	.046
			.268	.045		.035
12 .216	12-24	12-28	.362	.087	.043	.057
			.334	.068		.045
1/4 .250	1/4-20	1/4-28	.418	.100	.053	.075
			.388	.078		.062
5/16 .3125	5/16-18	5/16-24	.513	.116	.066	.090
			.493	.104		.078
3/8 .375	3/8-16	3/8-24	.635	.149	.069	.098
			.605	.129		.083

1. All threads are Class 2 free fit.
2. Screws 2" long and shorter are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.
3. Shipped in bulk or packed 1 gross per box.
4. Will be furnished with Alcoa's Alumilite finish, if specified.





ALCOA

JACKSON HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size				
	6-32	8-32	10-24	1/4-20	5/16-18
3/16	.042	.075	.100		
1/4	.052Θ	.090Θ	.119Θ		
5/16	.061Θ	.104Θ	.137	.314	.515
3/8	.071Θ	.119Θ	.156Θ	.347Θ	.568
7/16	.081	.133	.175	.380	.622
1/2	.091Θ	.148Θ	.193Θ	.414Θ	.675
9/16	.100	.162	.212	.447	.729
5/8	.110Θ	.177Θ	.231Θ	.480Θ	.782
11/16	.120	.191	.249	.513	.835
3/4	.130Θ	.206Θ	.268Θ	.547Θ	.889
7/8	.149	.235Θ	.306	.613Θ	.995
1	.169Θ	.264Θ	.343Θ	.679Θ	1.10
1-1/8	.188	.293	.380	.746	1.21
1-1/4	.208Θ	.322Θ	.418Θ	.812Θ	1.32
1-1/2	.247Θ	.380Θ	.493Θ	.945Θ	1.53
1-3/4	.286	.438	.568	1.08	1.74
2	.325Θ	.497Θ	.642Θ	1.21Θ	1.96
2-1/4	.383	.573	.746	1.37	2.21
2-1/2	.435	.646	.845	1.54	2.48
2-3/4	.486	.720	.945	1.71	2.75
3	....	.793	1.04	1.88	3.03

1. Items marked "Θ" are normally carried in stock by Alcoa with slotted type head.
2. Weights given are for coarse thread series; screws in the fine thread series will be slightly heavier.
3. 10-32 screws are stocked in same sizes as 10-24.



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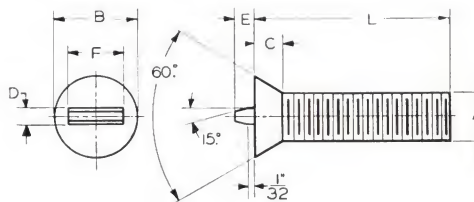
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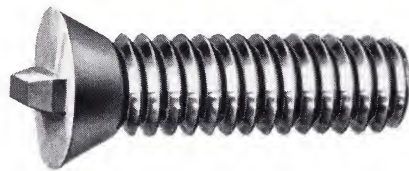
11

ALCOA**FINISHING HEAD
MACHINE SCREWS****Bright Finish****ALCOA 24S-T4 ALLOY****DIMENSIONS IN INCHES**

Nominal Size or Basic Major Diameter A	Thread Size		Head Diameter B	Head Height C	Thickness of Key D	Height of Key E	Width of Key F
	Coarse	Fine					
4 .112	4-40	4-48	.146 .138	.050 .044	.066 .060	1/16	.105 .095
5 .125	5-40	5-44	.188 .178	.065 .057	.066 .060	1/16	.125 .115
6 .138	6-32	6-40	.230 .218	.080 .070	.066 .060	1/16	.125 .115
8 .164	8-32	8-36	.273 .259	.095 .083	.066 .060	3/32	.165 .155
10 .190	10-24	10-32	.315 .299	.109 .095	.066 .060	3/32	.185 .175
1/4 .250	1/4-20	1/4-28	.415 .395	.144 .126	.081 .075	3/32	.250 .240
5/16 .3125	5/16-18	5/16-24	.518 .496	.178 .159	.081 .075	1/8	.270 .255
3/8 .375	3/8-16	3/8-24	.617 .597	.212 .192	.081 .075	1/8	.290 .275

1. These screws are designed for use where the heads are to be ground flush with the material through which the screw is inserted. The key design permits maximum utilization of screw strength and shears off flush to facilitate grinding or polishing.
2. Obtain from Alcoa information on procurement of special hand screw drivers or power screw driver bits.
3. Shipped in bulk or packed 1 gross per box.
4. Class 2 free fit threads.
5. Will be furnished with Alcoa's Alumilite finish, if specified.
6. Screws 2" long and under are threaded to within two threads of the head. Screws over 2" long have a minimum of 1-3/4" of thread. The unthreaded portion of the shank is not less than the minimum pitch diameter and not more than the maximum major diameter of the thread.





ALCOA

FINISHING HEAD MACHINE SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Thread Size							
	4-40	5-40	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
3/16	.027	.038	.050	.079				
1/4	.034	.046	.060	.093	.124			
5/16	.040	.055	.070	.108	.142	.270	.456	
3/8	.047	.063	.080	.122	.161	.304	.511	.774
7/16	.053	.071	.089	.137	.180	.337	.565	.853
1/2	.060	.080	.099	.152	.198	.371	.619	.933
9/16	.066	.088	.109	.166	.217	.405	.673	1.01
5/8	.072	.096	.119	.181	.236	.438	.728	1.09
11/16	.079	.105	.129	.195	.254	.472	.782	1.17
3/4	.085	.113	.138	.210	.273	.505	.836	1.25
7/8	.098	.130	.158	.239	.311	.572	.945	1.41
1	.111	.146	.177	.268	.348	.640	1.05	1.57
1-1/8	.124	.163	.197	.297	.385	.707	1.16	1.73
1-1/4	.137	.179	.216	.327	.423	.774	1.27	1.89
1-1/2	.163	.213	.255	.385	.498	.908	1.49	2.21
1-3/4	....	.246	.294	.443	.572	1.04	1.71	2.52
2	....	....	.333	.502	.647	1.18	1.92	2.84
2-1/4	....	....	.372	.560	.722	1.31	2.14	3.16
2-1/2	....	....	.411	.618	.797	1.45	2.36	3.48
2-3/4	....	....	.450	.676	.872	1.58	2.57	3.80
3	....	....	.490	.735	.946	1.71	2.79	4.11

- Weights as given are for the coarse thread series. Screws in the fine thread series will be slightly heavier.
- Finishing Head Screws are not normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



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WOOD SCREWS • LAG BOLTS

SLOTTED AND PHILLIPS RECESSED

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Square Head Lag Bolts	124

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WOOD SCREWS AND LAG BOLTS

The addition of the Phillips recessed head in all head styles of Alcoa aluminum wood screws has greatly increased the driving torque which can be applied to these screws, adding another advantage to the superior appearance and corrosion resistant qualities which have resulted in their widespread use in many fields.

In addition to their use in fastening one wooden member to another, these screws should be specified whenever aluminum sheet or hardware is to be fastened to wooden supports. Alcoa aluminum wood screws are furnished in all of the popular sizes and head styles with either slot or Phillips recess.

Lag bolts are available for use where a wrenching head is required in preference to a screw driver head or where the size required is larger than normally supplied in wood screws.

Wood screws and lag bolts are made from upset blanks and the threads are usually cut although rolled thread parts have been made in special cases.

For satisfactory results, the member into which the screw is to be driven should have a lead hole of proper diameter to provide maximum holding power. Table No. 15 on page 236 lists recommended hole sizes for various grades of wood.

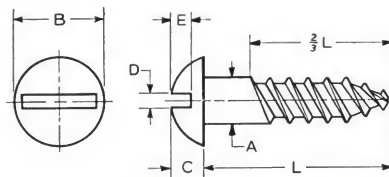


WOOD SCREWS AND LAG BOLTS

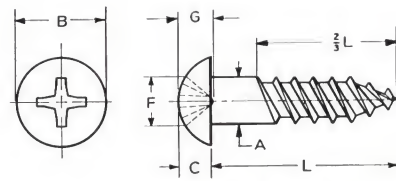
ALCOA

ROUND HEAD WOOD SCREWS

Bright Finish



Slotted Head



Phillips Recessed Head

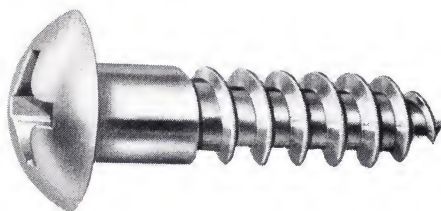
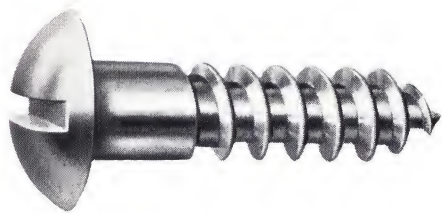
ALCOA 24S-T4 ALLOY
(American Standard B18.6)

DIMENSIONS IN INCHES

Nominal Size or Basic Diameter of Screw A	Number of Threads Per Inch	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
3 .099	24	.187 .169	.078 .067	.035 .027	.053 .040	.119 .109	.097 .087	1
4 .112	22	.211 .193	.086 .075	.039 .031	.058 .044	.127 .117	.105 .095	1
5 .125	20	.236 .217	.095 .083	.043 .036	.063 .047	.151 .141	.104 .094	2
6 .138	18	.260 .240	.103 .091	.048 .039	.068 .051	.159 .149	.112 .102	2
7 .151	16	.285 .264	.111 .099	.048 .039	.072 .055	.167 .157	.120 .110	2
8 .164	15	.309 .287	.120 .107	.054 .045	.077 .058	.175 .165	.128 .118	2
9 .177	14	.334 .311	.128 .115	.054 .045	.082 .062	.183 .173	.137 .127	2
10 .190	13	.359 .334	.137 .123	.060 .050	.087 .065	.192 .182	.145 .135	2
12 .216	11	.408 .382	.153 .139	.067 .056	.096 .073	.246 .236	.165 .155	3
14 .242	10	.457 .429	.170 .155	.075 .064	.106 .080	.262 .252	.182 .172	3
16 .268	9	.506 .476	.187 .171	.075 .064	.115 .087	.278 .268	.198 .188	3

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see Table No. 15, page 236.





ALCOA

ROUND HEAD WOOD SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

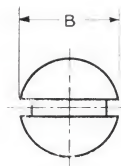
Length L Inches	Screw Size										
	3	4	5	6	7	8	9	10	12	14	16
3/8	.048	.061★	.078	.099	.124	.151					
1/2	.057	.072★	.093⊖	.117★	.146★	.175★					
5/8	.064	.084★	.111⊖	.135★	.167⊖	.200★	.239	.279			
3/4	.072	.094★	.125★	.156★	.188★	.226★	.273★	.318★	.424		
7/8	.082	.109	.140⊖	.174★	.213	.254★	.305	.354★	.474		
1	.091	.119⊖	.158★	.192★	.236★	.283★	.337★	.394★	.524★	.677	.920
1-1/4	.111	.143	.182	.239★	.293★	.347★	.409★	.480★	.635★	.818	1.07
1-1/2	.130	.166	.213	.272★	.336⊖	.398★	.473★	.552★	.729★	.936⊖	1.23
1-3/4	....	....	....	.296	.370	.455★	.538	.627★	.833★	1.07 ⊖	1.37
2	....	....	....	....	....	.517★	.606	.703★	.934★	1.20 ★	1.51
2-1/4	....	....	....	....	....	....	....	.782	1.04	1.32	1.65
2-1/2	....	....	....	....	....	....	....	.868	1.15 ★	1.46 ★	1.82
3	....	....	....	....	....	....	....	....	1.35	1.72	2.31

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.

ALCOA

FLAT HEAD WOOD SCREWS

Bright Finish



Slotted Head



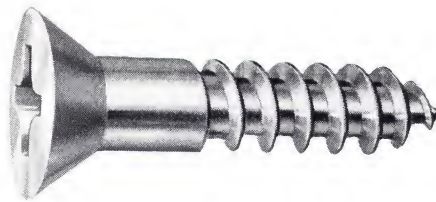
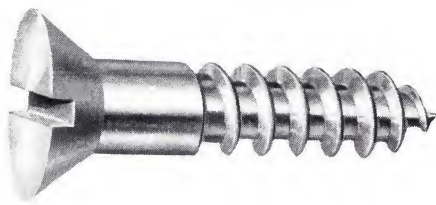
Phillips Recessed Head

ALCOA 245-T4 ALLOY
(American Standard B18.6)

DIMENSIONS IN INCHES

Nominal Size or Basic Diameter of Screw A	Number of Threads Per Inch	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
3 .099	24	.199 .181	.059 .048	.035 .027	.027 .017	.104 .094	.065 .055	1
4 .112	22	.225 .207	.067 .055	.039 .031	.030 .020	.125 .115	.086 .076	1
5 .125	20	.252 .232	.075 .062	.043 .035	.034 .022	.151 .141	.083 .073	2
6 .138	18	.279 .257	.083 .069	.048 .039	.038 .024	.171 .161	.103 .093	2
7 .151	16	.305 .283	.091 .076	.048 .039	.041 .027	.186 .176	.118 .108	2
8 .164	15	.332 .308	.100 .084	.054 .045	.045 .029	.201 .191	.133 .123	2
9 .177	14	.358 .334	.108 .091	.054 .045	.049 .032	.211 .201	.143 .133	2
10 .190	13	.385 .359	.116 .098	.060 .050	.053 .034	.255 .245	.143 .133	3
12 .216	11	.438 .410	.132 .112	.067 .056	.060 .039	.280 .270	.168 .158	3
14 .242	10	.491 .461	.148 .127	.075 .064	.068 .044	.300 .290	.188 .178	3
16 .268	9	.544 .512	.164 .141	.075 .064	.075 .049	.324 .314	.213 .203	3

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see Table No. 15, page 236.



ALCOA

FLAT HEAD WOOD SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size										
	3	4	5	6	7	8	9	10	12	14	16
3/8	.037	.046★	.057	.072	.090	.109					
1/2	.046	.057★	.072⊖	.090★	.112⊖	.133★					
5/8	.053	.069★	.090★	.108★	.133⊖	.158★	.186	.216⊖			
3/4	.061	.079★	.104★	.129★	.154★	.184★	.220⊖	.255★	.335		
7/8	.071	.094⊖	.119★	.147★	.179⊖	.212★	.252⊖	.291★	.385		
1	.080	.104⊖	.137★	.165★	.202★	.241★	.284★	.331★	.435★	.553	.756
1-1/4	.100	.128	.161	.212★	.259⊖	.305★	.356★	.417★	.546★	.694★	.910
1-1/2	.119	.151	.192	.245★	.302★	.356★	.420★	.489★	.640★	.812★	1.06
1-3/4	....	....	....	.269	.336	.413★	.485	.564★	.744★	.946★	1.21
2	....	....	....	....	....	.475★	.553	.640★	.845★	1.08★	1.34
2-1/4	....	....	....	....	....	....	....	.719	.950	1.20	1.49
2-1/2	....	....	....	....	....	....	....	.805	1.06★	1.34★	1.66
3	....	....	....	....	....	....	....	....	1.27	1.60★	2.15

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.



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Screws

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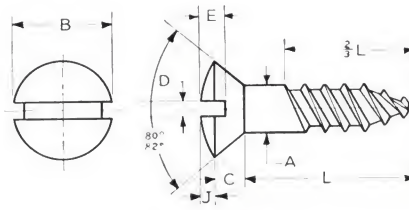
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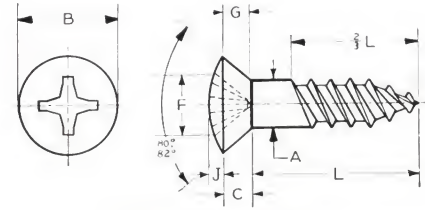
ALCOA

OVAL HEAD WOOD SCREWS

Bright Finish



Slotted Head



Phillips Recessed Head

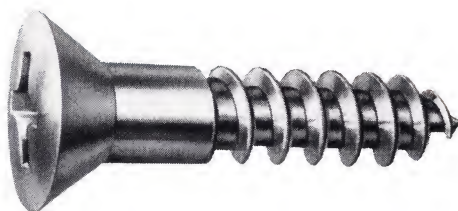
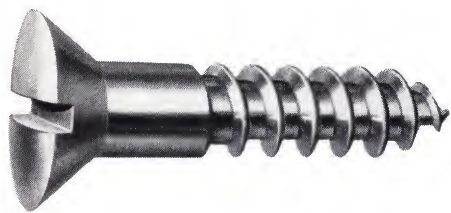
ALCOA 24S-T4 ALLOY
(American Standard B18.6)

DIMENSIONS IN INCHES

Nominal Size or Basic Diameter of Screw A	Number of Threads Per Inch	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Oval Height J	Phillips Head Driver Size No.
3 .099	24	.199	.059	.035	.052	.121	.090	.033	1
		.181	.048	.027	.043	.111	.080	.025	
4 .112	22	.225	.067	.039	.059	.133	.103	.037	1
		.207	.055	.031	.049	.123	.093	.029	
5 .125	20	.252	.075	.043	.067	.155	.098	.041	2
		.232	.062	.035	.055	.145	.088	.033	
6 .138	18	.279	.083	.048	.074	.175	.119	.045	2
		.257	.069	.039	.060	.165	.109	.036	
7 .151	16	.305	.091	.048	.081	.186	.131	.049	2
		.283	.076	.039	.066	.176	.121	.040	
8 .164	15	.332	.100	.054	.088	.202	.148	.052	2
		.308	.084	.045	.072	.192	.138	.042	
9 .177	14	.358	.108	.054	.095	.213	.159	.056	2
		.334	.091	.045	.078	.203	.149	.046	
10 .190	13	.385	.116	.060	.103	.258	.166	.060	3
		.359	.098	.050	.084	.248	.156	.050	
12 .216	11	.438	.132	.067	.117	.280	.189	.068	3
		.410	.112	.056	.096	.270	.179	.057	
14 .242	10	.491	.148	.075	.132	.302	.213	.076	3
		.461	.127	.064	.108	.292	.203	.063	
16 .268	9	.544	.164	.075	.146	.329	.241	.084	3
		.512	.141	.064	.120	.319	.231	.071	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see Table No. 15, page 236.





ALCOA

OVAL HEAD WOOD SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size										
	3	4	5	6	7	8	9	10	12	14	16
3/8	.045	.057	.072	.093	.117	.143					
1/2	.054	.068★	.087★	.111★	.139⊖	.167⊖					
5/8	.061	.080★	.105★	.129★	.160	.192★	.229	.269⊖			
3/4	.069	.090★	.119★	.150★	.181⊖	.218★	.263⊖	.308⊖	.413		
7/8	.079	.105	.134	.168★	.206	.246★	.295	.344⊖	.463		
1	.088	.115★	.152★	.186★	.229★	.275★	.327⊖	.384★	.513★	.662	.893
1-1/4	.108	.139	.176	.233★	.286★	.339★	.399⊖	.470★	.624★	.803	1.05
1-1/2	.127	.162	.207	.266★	.329⊖	.390★	.463⊖	.542★	.718★	.921★	1.20
1-3/4	....	....	....	.290	.363	.447⊖	.528	.617	.822★	1.06	1.35
2	....	....	....	....	....	.509★	.596	.693★	.923★	1.18 ★	1.48
2-1/4	....	....	....	....	....	....	....	.772	1.03	1.31	1.63
2-1/2	....	....	....	....	....	....	....	.858	1.13	1.45	1.80
3	....	....	....	....	....	....	....	....	1.34	1.71	2.29

- Items marked "⊖" are normally carried in stock by Alcoa with slotted type head.
Items marked "★" are normally carried in stock by Alcoa in both slotted and Phillips type heads.
- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.



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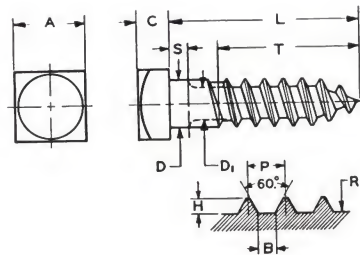
SQUARE HEAD LAG BOLTS

(GIMLET POINT)

Dip Finish

ALCOA 24S-T4 ALLOY

(American Institute of Bolt, Nut and
Rivet Manufacturers Standard)



DIMENSIONS IN INCHES

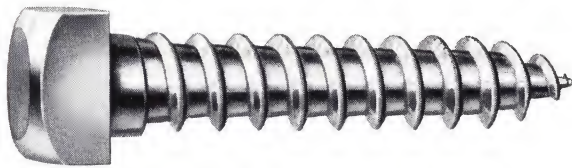
Nominal Size or Basic Major Diameter D	Threads Per Inch	Width Across Flats A	Height of Head C	Thread Dimensions				Length of Shoulder For Rolled Thread		
				Pitch P	Flat at Root B	Depth of Thread H	Root Diameter R	To, and including, 1-1/2 Long S	1-5/8 & 1-3/4 Long S	2 and Longer S
1/4 .250	10	3/8	11/64	.100	.043	.039	.173	3/32	3/16	3/16
5/16 .3125	9	1/2	13/64	.111	.048	.043	.227	1/8	1/4	1/4
3/8 .375	7	9/16	1/4	.143	.062	.055	.265	1/8	1/4	1/4
1/2 .500	6	3/4	21/64	.167	.072	.064	.371	5/32	1/4	5/16
5/8 .625	5	15/16	27/64	.200	.086	.077	.471	....	5/16	3/8
3/4 .750	4-1/2	1-1/8	1/2	.222	.096	.085	.579	....	3/8	1/2
7/8 .875	4	1-5/16	19/32	.250	.108	.096	.683	....	3/8	1/2
1 1.000	3-1/2	1-1/2	21/32	.286	.123	.110	.780	....	....	5/8

MINIMUM THREAD LENGTH—T

Bolt Length L Inches	Nominal Diameter of Bolt—D									
	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
1	3/4	3/4	3/4	3/4	3/4					
1-1/2	1-1/8	1-1/8	1-1/8	1-1/8	1-1/8					
2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2			
2-1/2	1-1/2	1-5/8	1-5/8	1-3/4	1-3/4	1-3/4	1-3/4			
3	2	2	2	2	2	2	2	2	2	2
4	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2
5	3	3	3	3	3	3	3	3	3	3
6	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2

- Length of thread on intermediate bolt lengths shall be that of the next shorter bolt length listed.
- Bolt length (L) is measured from under the head to the end of the bolt.
- Thread length (T) is measured from the end of the bolt to the end of the imperfect thread.
- Tolerance on bolt length (L): Sizes up to and including 1/2", plus or minus 1/8"; sizes over 1/2", plus or minus 1/4".
- Threads shall be rolled or cut. Diameter of rolled thread shank is not dimensioned but is indicated by D1. All rolled thread lag bolts shall be provided with shoulder (S).
- Will be furnished with Alcoa's Alumilite finish, if specified.





ALCOA

SQUARE HEAD LAG BOLTS

(GIMLET POINT)

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Diameter—Inches								Packing
	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	
									100 Pieces Per Box
1	.598	1.04	1.58						50 Pieces Per Box
1-1/4	.720	1.23	1.85						
1-1/2	.773	1.36	1.97	4.01					
1-3/4	.895	1.54	2.25	4.51					
2	.952	1.64	2.35	4.76	8.31				25 Pieces Per Box
2-1/2	1.20	2.02	2.88	5.58	9.59				
3	1.35	2.27	3.26	6.37	10.9	16.9	24.6	33.4	Nor- mally Packed in Bulk
3-1/2	1.60	2.65	3.79	7.34	12.4	19.0	27.5	37.2	
4	1.75	2.91	4.15	7.98	13.5	20.6	29.7	40.1	
4-1/2	.....	3.29	4.69	8.95	15.0	22.8	32.6	44.0
5	.....	3.53	5.05	9.63	16.0	24.3	34.8	46.9
5-1/2	.....	.....	5.58	10.6	17.5	26.5	37.6	50.5
6	.....	.....	5.94	11.2	18.6	28.1	39.7	53.3

1. Packed in bulk or packed in boxes as indicated above.
2. Lag Bolts are not normally carried in stock by Alcoa.



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GIMLET POINT ("A" TYPE)	Page
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SHEET METAL SCREWS

Sheet metal screws are the newest members of Alcoa's family of good looking, strong, dependable fasteners. Their manufacture was undertaken in response to a widespread demand for an economical and effective method of fastening together several thicknesses of aluminum sheet or of fastening sheet to extruded sections used as supports. Because they are simply driven into a pierced or drilled hole of proper size, their use eliminates costly tapping operations and permits a secure threaded fastening in locations which are accessible from only one side. Alcoa aluminum sheet metal screws were designed for fastening aluminum to aluminum, but have been successfully used to fasten sheet to soft materials such as plastic, fiber, or wood.

Since sheet metal screws are driven into a hole which is smaller than the major diameter of the screw, it is important that this hole be drilled or pierced to such size as will permit maximum holding power without damage to the screw threads in driving. Table No. 16 on page 237 indicates recommended hole sizes for pierced and drilled holes in various alloys and thicknesses of material.

Alcoa aluminum sheet metal screws are supplied in two types. The type "A" or gimlet point type is used for the lighter gages of sheet while the type "Z" (sometimes referred to as type "B") or blunt point type is used in heavier gages of sheet as well as to fasten sheet to extruded sections or castings. Both thread types are supplied in a variety of head styles both slotted and with the Phillips recess. Both types are made from upset blanks and have rolled threads.

Alcoa aluminum sheet metal screws are used in large quantities for fastening aluminum sheet siding and roofing on industrial and farm buildings. Sheet aluminum duct work for heating, ventilating, and air conditioning systems is another field where the advantages of Alcoa sheet metal screws have been widely recognized. In the manufacturing industries, the assembly of bus, truck, and trailer bodies as well as awnings and venetian blinds made of aluminum sheet are illustrative of the application of these fasteners.



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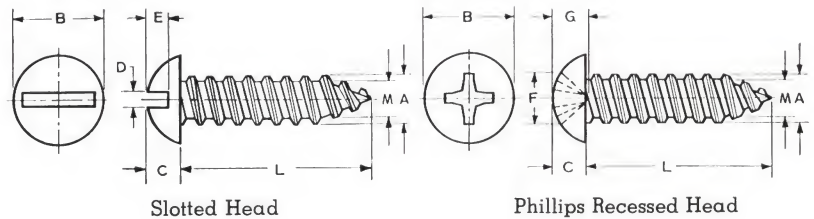
ALCOA

ROUND HEAD (A-TYPE—GIMLET POINT) SHEET METAL SCREWS

Bright Finish

ALCOA 24S-T4 ALLOY

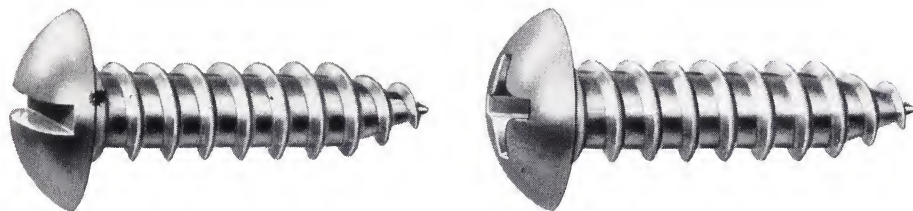
(American Standard B18.6)



DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diameter A	Minor Diameter M	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.061	.162	.069	.031	.048	.097	.071	1
		.084	.056	.146	.059	.023	.037	.087	.061	
3	28	.101	.076	.187	.078	.035	.053	.106	.080	1
		.097	.071	.169	.067	.027	.040	.096	.070	
4	24	.114	.083	.211	.086	.039	.058	.115	.090	1
		.110	.078	.193	.075	.031	.044	.105	.080	
5	20	.130	.095	.236	.095	.043	.063	.151	.104	2
		.126	.090	.217	.083	.035	.047	.141	.094	
6	18	.141	.102	.260	.103	.048	.068	.159	.112	2
		.136	.096	.240	.091	.039	.051	.149	.102	
7	16	.158	.114	.285	.111	.048	.072	.167	.120	2
		.152	.108	.264	.099	.039	.053	.157	.110	
8	15	.168	.123	.309	.120	.054	.077	.175	.128	2
		.162	.116	.287	.107	.045	.058	.165	.118	
10	12	.194	.133	.359	.137	.060	.087	.192	.145	2
		.188	.126	.334	.123	.050	.065	.182	.135	
12	11	.221	.162	.408	.153	.067	.096	.246	.165	3
		.215	.155	.382	.139	.056	.072	.236	.155	
14	10	.254	.185	.457	.169	.075	.105	.262	.182	3
		.248	.178	.429	.156	.064	.078	.252	.172	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.



ALCOA

ROUND HEAD (A-TYPE) SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
1/4	.041★	.066★					
3/8	.053★	.084★	.105★	.125★	.176		
1/2	.066★	.103★	.127★	.151★	.208	.285	.373
5/8	.078	.121★	.150★	.177★	.241	.330	.431
3/4	.090	.139★	.172★	.203★	.273★	.376★	.490★
1	....	.175	.216★	.255★	.338★	.467★	.607★
1-1/4	....	.212	.261	.307★	.403★	.557★	.724★
1-1/2	....	.248	.305	.359	.468	.648	.840★
1-3/4	....	....	....	....	.533	....	.957
2	....	....	....	....	.598	....	1.07

- Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
- Items marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.

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ALCOA

FLAT HEAD (A-TYPE—GIMLET POINT) SHEET METAL SCREWS

Bright Finish**ALCOA 24S-T4 ALLOY****(American Standard B18.6)**

Slotted Head



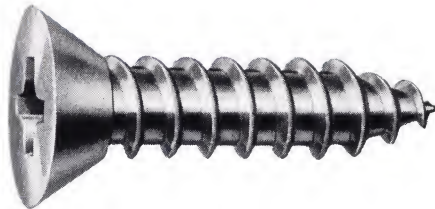
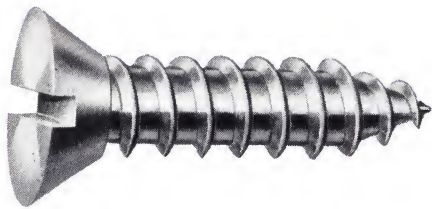
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diameter A	Minor Diameter M	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.061	.172	.051	.031	.023	.099	.060	1
		.084	.056	.156	.040	.023	.015	.089	.050	
3	28	.101	.076	.199	.059	.035	.027	.104	.065	1
		.097	.071	.181	.048	.027	.017	.094	.055	
4	24	.114	.083	.225	.067	.039	.030	.125	.086	1
		.110	.078	.207	.055	.031	.020	.115	.076	
5	20	.130	.095	.252	.075	.043	.034	.151	.083	2
		.126	.090	.232	.062	.035	.022	.141	.073	
6	18	.141	.102	.279	.083	.048	.038	.171	.103	2
		.136	.096	.257	.069	.039	.024	.161	.093	
7	16	.158	.114	.305	.091	.048	.041	.179	.111	2
		.152	.108	.283	.076	.039	.027	.169	.101	
8	15	.168	.123	.332	.100	.054	.045	.186	.118	2
		.162	.116	.308	.084	.045	.029	.176	.108	
10	12	.194	.133	.385	.116	.060	.053	.201	.133	2
		.188	.126	.359	.098	.050	.034	.191	.123	
12	11	.221	.162	.438	.132	.067	.060	.265	.153	3
		.215	.155	.410	.112	.056	.039	.255	.143	
14	10	.254	.185	.491	.148	.075	.068	.280	.168	3
		.248	.178	.461	.127	.064	.044	.270	.158	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.





ALCOA

FLAT HEAD (A-TYPE) SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
1/4	.031	.049					
3/8	.043	.067	.083	.099	.135		
1/2	.056	.085	.105	.125	.167	.225	.291
5/8	.068	.103	.128	.151	.200	.270	.349
3/4	.080	.122	.150	.177	.232	.315	.408
1	....	.158	.194	.229	.297	.406	.525
1-1/4	....	.194	.239	.280	.362	.497	.642
1-1/2	....	.231	.283	.332	.427	.588	.759
1-3/4	....	....	....	....	.492	....	.876
2	....	....	....	....	.557	....	.993

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Type A flat head sheet metal screws are not normally carried in stock by Alcoa.



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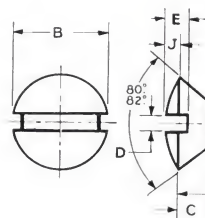
ALCOA

OVAL HEAD (A-TYPE—GIMLET POINT) SHEET METAL SCREWS

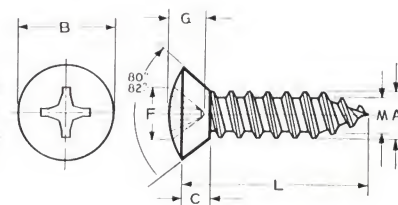
Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)



Slotted Head



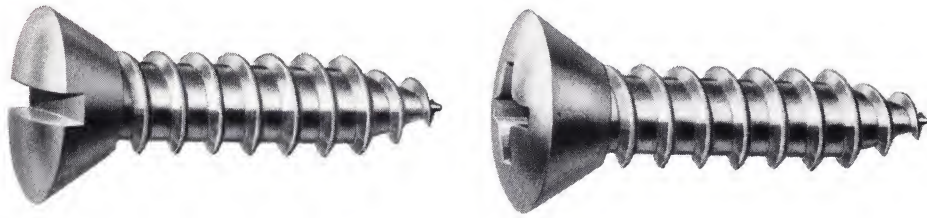
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Oval Height J	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.061	.172	.051	.031	.045	.029	.109	.078	1
		.084	.056	.156	.040	.023	.037	.023	.099	.068	
3	28	.101	.076	.199	.059	.035	.052	.033	.121	.090	1
		.097	.071	.181	.048	.027	.043	.025	.111	.080	
4	24	.114	.083	.225	.067	.039	.059	.037	.133	.103	1
		.110	.078	.207	.055	.031	.049	.029	.123	.093	
5	20	.130	.095	.252	.075	.043	.067	.041	.155	.098	2
		.126	.090	.232	.062	.035	.055	.033	.145	.088	
6	18	.141	.102	.279	.083	.048	.074	.045	.175	.119	2
		.136	.096	.257	.069	.039	.060	.036	.165	.109	
7	16	.158	.114	.305	.091	.048	.081	.049	.180	.124	2
		.152	.108	.283	.076	.039	.066	.039	.170	.114	
8	15	.168	.123	.332	.100	.054	.088	.052	.189	.133	2
		.162	.116	.308	.084	.045	.072	.042	.179	.123	
10	12	.194	.133	.385	.116	.060	.103	.060	.206	.151	2
		.188	.126	.359	.098	.050	.084	.050	.196	.141	
12	11	.221	.162	.438	.132	.067	.117	.068	.267	.174	3
		.215	.155	.410	.112	.056	.096	.057	.257	.164	
14	10	.254	.185	.491	.148	.075	.132	.077	.285	.193	3
		.248	.178	.461	.127	.064	.108	.064	.275	.183	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.





ALCOA
OVAL HEAD
 (A-TYPE)
SHEET METAL
SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
1/4	.038	.062					
3/8	.050	.080	.100	.121	.170		
1/2	.063	.098	.122	.147	.202	.275	.362
5/8	.075	.116	.145	.173	.235	.320	.421
3/4	.087	.134	.167	.199	.267	.366	.479
1	....	.171	.211	.251	.332	.457	.596
1-1/4	....	.207	.256	.303	.397	.548	.713
1-1/2	....	.244	.301	.354	.462	.638	.830
1-3/4	....	....	....	....	.527	....	.947
2	....	....	....	....	.592	....	1.06

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Oval head sheet metal screws are not normally carried in stock by Alcoa.

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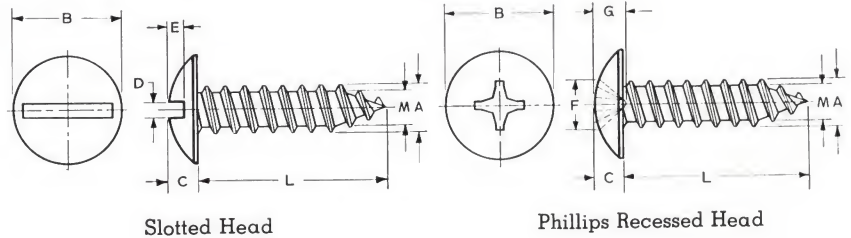
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ALCOA

TRUSS HEAD (A-TYPE—GIMLET POINT) SHEET METAL SCREWS Bright Finish

ALCOA 24S-T4 ALLOY
(American Standard B18.6)



Slotted Head

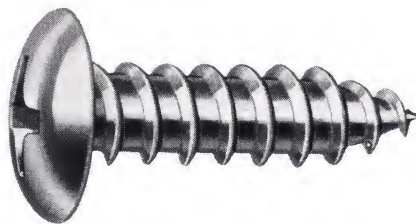
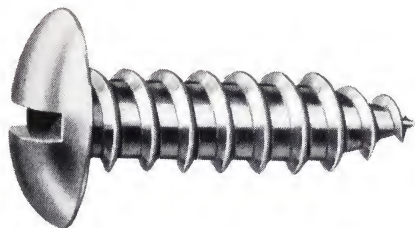
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diameter A	Minor Diameter M	Head Diameter B	Head Height C	Width of Slot D	Depth of Slot E	Diameter of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.061	.194	.053	.031	.031	.101	.071	1
		.084	.056	.180	.044	.023	.022	.091	.061	
3	28	.101	.076	.226	.061	.035	.036	.109	.080	1
		.097	.071	.211	.051	.027	.026	.099	.070	
4	24	.114	.083	.257	.069	.039	.040	.109	.078	1
		.110	.078	.241	.059	.031	.030	.099	.068	
5	20	.130	.095	.289	.078	.043	.045	.125	.095	1
		.126	.090	.272	.066	.035	.034	.115	.085	
6	18	.141	.102	.321	.086	.048	.050	.155	.100	2
		.136	.096	.303	.074	.039	.037	.145	.090	
7	16	.158	.114	.352	.094	.048	.054	.162	.107	2
		.152	.108	.333	.081	.039	.041	.152	.097	
8	15	.168	.123	.384	.102	.054	.058	.170	.115	2
		.162	.116	.364	.088	.045	.045	.160	.105	
10	12	.194	.133	.448	.118	.060	.068	.185	.131	2
		.188	.126	.425	.103	.050	.053	.175	.121	
12	11	.221	.162	.511	.134	.067	.077	.245	.155	3
		.215	.155	.487	.118	.056	.061	.235	.145	
14	10	.254	.185	.573	.150	.075	.087	.260	.170	3
		.248	.178	.546	.133	.064	.070	.250	.160	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.





ALCOA

TRUSS HEAD (A-TYPE) SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
1/4	.047	.078★					
3/8	.059	.096★	.121★	.148★	.212		
1/2	.071	.114★	.144★	.174★	.244	.333	.450
5/8	.084	.133★	.166★	.200★	.277	.378	.508
3/4	.096	.151★	.188	.226	.309★	.424	.567
1	....	.187	.233	.278	.314★	.515	.684
1-1/4	....	.224	.277	.330	.439★	.605	.801
1-1/2	....	.260	.322	.382	.504	.696	.918
1-3/4	....	....	....	....	.569	....	1.04
2	....	....	....	....	.634	....	1.15

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.

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ALCOA

PAN HEAD

(BINDING HEAD)

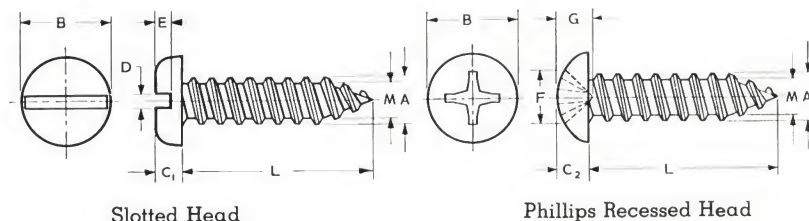
(A-TYPE—GIMLET POINT)

SHEET METAL SCREWS

Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)

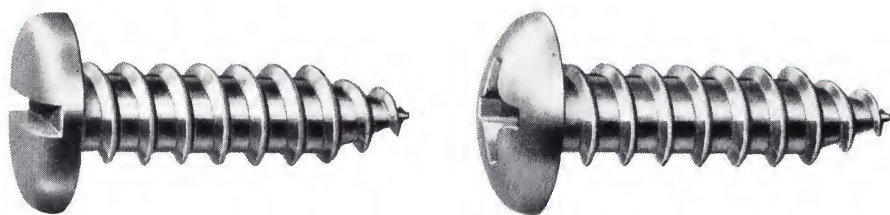


DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam.	Minor Diam.	Head Diam.	Head Height (Slotted)	Head Height (Phillips)	Width of Slot	Depth of Slot	Diam. of Recess	Depth of Recess	Phillips Head Driver Size No.
		A	M	B	C ₁	C ₂	D	E	F	G	
2	32	.088	.061	.167	.053	.062	.031	.033	.101	.071	1
		.084	.056	.155	.045	.053	.023	.023	.091	.061	
3	28	.101	.076	.193	.060	.071	.035	.037	.109	.080	1
		.097	.071	.180	.051	.062	.027	.027	.099	.070	
4	24	.114	.083	.219	.068	.080	.039	.041	.119	.090	1
		.110	.078	.205	.058	.070	.031	.030	.109	.080	
5	20	.130	.095	.245	.075	.089	.043	.045	.155	.103	2
		.126	.090	.231	.065	.079	.035	.032	.145	.093	
6	18	.141	.102	.270	.082	.097	.048	.050	.163	.111	2
		.136	.096	.256	.072	.087	.039	.038	.153	.101	
7	16	.158	.114	.296	.089	.106	.048	.055	.173	.120	2
		.152	.108	.281	.079	.096	.039	.040	.163	.110	
8	15	.168	.123	.322	.096	.115	.054	.058	.179	.127	2
		.162	.116	.306	.085	.105	.045	.043	.169	.117	
10	12	.194	.133	.373	.110	.133	.060	.067	.196	.145	2
		.188	.126	.357	.099	.122	.050	.050	.186	.135	
12	11	.221	.162	.425	.125	.151	.067	.077	.256	.171	3
		.215	.155	.407	.112	.139	.056	.060	.246	.161	
14	10	.254	.185	.476	.136	.169	.075	.087	.278	.192	3
		.248	.178	.457	.126	.156	.064	.070	.268	.182	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.





ALCOA
PAN HEAD
 (BINDING HEAD)
 (A-TYPE)
SHEET METAL
SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
1/4	.047★	.079★					
3/8	.059★	.097★	.123★	.149★	.212		
1/2	.072★	.115★	.145★	.175★	.244	.336	.444
5/8	.084	.134★	.168★	.201★	.277	.381	.502
3/4	.096	.152★	.190★	.227★	.309★	.427★	.561★
1	....	.188	.234★	.279★	.374★	.517★	.678★
1-1/4	....	.225	.279	.331★	.439★	.608★	.795★
1-1/2	....	.261	.324	.383	.504	.699	.912★
1-3/4	....	....	....	....	.569	....	1.03
2	....	....	....	....	.635	....	1.15

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.



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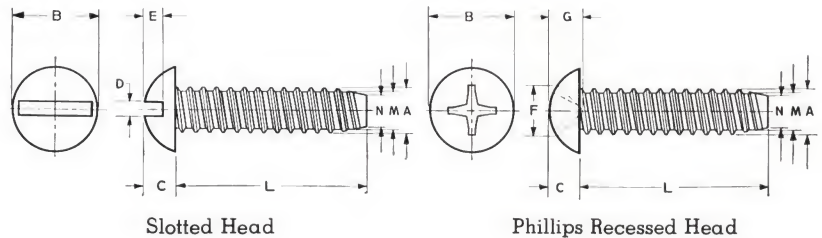
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ALCOA

ROUND HEAD
(Z-TYPE*—BLUNT POINT)
SHEET METAL SCREWS
Bright Finish

ALCOA 24S-T4 ALLOY
(American Standard B18.6)

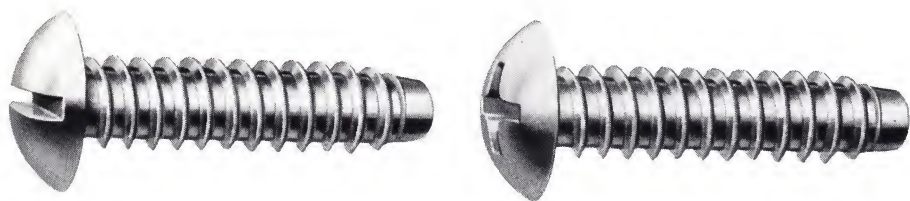


DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Point Diam. N	Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088 .084	.064 .060	.055 .052	.162 .146	.069 .059	.031 .023	.048 .037	.097 .087	.071 .061	1
3	28	.101 .097	.075 .071	.069 .066	.187 .169	.078 .067	.035 .027	.053 .040	.106 .096	.080 .070	1
4	24	.114 .110	.086 .082	.078 .075	.211 .193	.086 .075	.039 .031	.058 .044	.115 .105	.090 .080	1
5	20	.130 .126	.094 .090	.084 .081	.236 .217	.095 .083	.043 .035	.063 .047	.151 .141	.104 .094	2
6	20	.139 .135	.104 .099	.093 .090	.260 .240	.103 .091	.048 .039	.068 .051	.159 .149	.112 .102	2
7	19	.154 .149	.115 .109	.101 .098	.285 .264	.111 .099	.048 .039	.072 .053	.167 .157	.120 .110	2
8	18	.166 .161	.122 .116	.107 .104	.309 .287	.120 .107	.054 .045	.077 .058	.175 .165	.128 .118	2
10	16	.189 .183	.141 .135	.130 .127	.359 .334	.137 .123	.060 .050	.087 .065	.192 .182	.145 .135	2
12	14	.215 .209	.164 .157	.146 .143	.408 .382	.153 .139	.067 .056	.096 .072	.246 .236	.165 .155	3
14	14	.246 .240	.192 .185	.174 .170	.457 .429	.169 .156	.075 .064	.105 .078	.262 .252	.182 .172	3

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.
4. *This type of sheet metal screw thread is sometimes referred to as type "B."





ALCOA

ROUND HEAD (Z-TYPE) SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
3/16	.037	.061					
1/4	.043	.071★	.090	.106	.158		
5/16	.049	.080★	.101	.120★	.176★		
3/8	.056	.090★	.113	.133★	.194★	.265★	.357
1/2	.069	.108★	.136	.159★	.229★	.312★	.420★
5/8	.082	.127	.160	.185★	.265★	.359★	.483★
3/4	.094	.146	.183	.212★	.300★	.405★	.546★
7/8	....	.165	.206	.238★	.336★	.452	.609★
1	....	.184	.230	.265★	.371★	.499	.671★
1-1/4	....	....	....	.317	.442	....	.797
1-1/2	....	....	....	.370	.513	....	.923
1-3/4	....	....	....	....	.585	....	1.05
2	....	....	....	....	.656	....	1.17

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items Marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.

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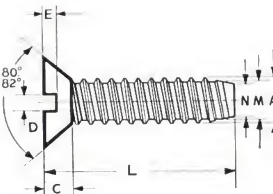
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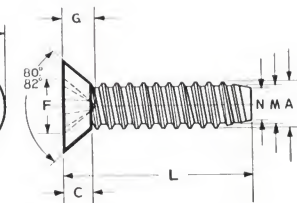
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ALCOA

FLAT HEAD (Z-TYPE*—BLUNT POINT) SHEET METAL SCREWS

Bright Finish**ALCOA 24S-T4 ALLOY****(American Standard B18.6)**

Slotted Head



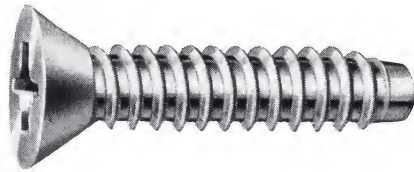
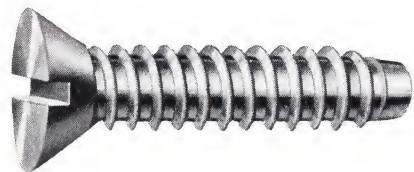
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Point Diam. N	Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.064	.055	.172	.051	.031	.023	.099	.060	1
		.084	.060	.052	.156	.040	.023	.015	.089	.050	
3	28	.101	.075	.069	.199	.059	.035	.027	.104	.065	1
		.097	.071	.066	.181	.048	.027	.017	.094	.055	
4	24	.114	.086	.078	.225	.067	.039	.030	.125	.086	1
		.110	.082	.075	.207	.055	.031	.020	.115	.076	
5	20	.130	.094	.084	.252	.075	.043	.034	.151	.083	2
		.126	.090	.081	.232	.062	.035	.022	.141	.073	
6	20	.139	.104	.093	.279	.083	.048	.038	.171	.103	2
		.135	.099	.090	.257	.069	.039	.024	.161	.093	
7	19	.154	.115	.101	.305	.091	.048	.041	.179	.111	2
		.149	.109	.098	.283	.076	.039	.027	.169	.101	
8	18	.166	.122	.107	.332	.100	.054	.045	.186	.118	2
		.161	.116	.104	.308	.084	.045	.029	.176	.108	
10	16	.189	.141	.130	.385	.116	.060	.053	.201	.133	2
		.183	.135	.127	.359	.098	.050	.034	.191	.123	
12	14	.215	.164	.146	.438	.132	.067	.060	.265	.153	3
		.209	.157	.143	.410	.112	.056	.039	.255	.143	
14	14	.246	.192	.174	.491	.148	.075	.068	.280	.168	3
		.240	.185	.170	.461	.127	.064	.044	.270	.158	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.
4. *This type of sheet metal screw thread is sometimes referred to as type "B."





ALCOA

FLAT HEAD (Z-TYPE) SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
3/16	.027	.043					
1/4	.033	.053Θ	.066	.079	.115		
5/16	.039	.062Θ	.078	.092Θ	.133		
3/8	.046	.071Θ	.089	.105Θ	.150	.204	.266
1/2	.059	.090Θ	.113	.132Θ	.186	.251	.329
5/8	.072	.109	.136	.158Θ	.221	.297	.392
3/4	.084	.128	.159	.185Θ	.257	.344	.454
7/8	....	.147	.183	.211	.292	.391	.517
1	....	.166	.206	.237	.328	.437	.580
1-1/4	....	....	....	.290	.399	....	.706
1-1/2	....	....	....	.343	.470	....	.831
1-3/4	....	....	....	....	.541	....	.957
2	....	....	....	....	.612	....	1.08

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items marked "Θ" are normally kept in stock by Alcoa in the slotted type head.



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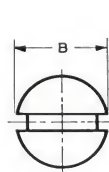
ALCOA

OVAL HEAD (Z-TYPE*—BLUNT POINT) SHEET METAL SCREWS

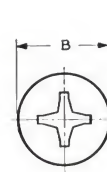
Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)



Slotted Head



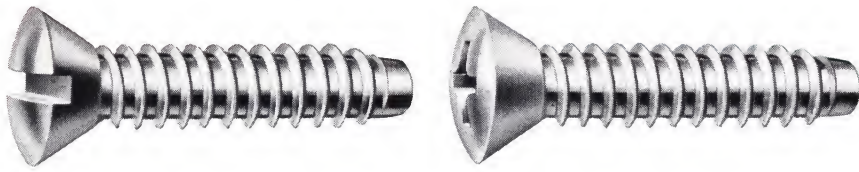
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Point Diam. N	Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Oval Height J	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088 .084	.064 .060	.055 .052	.172 .156	.051 .040	.031 .023	.045 .037	.029 .023	.109 .099	.078 .068	1
3	28	.101 .097	.075 .071	.069 .066	.199 .181	.059 .048	.035 .027	.052 .043	.033 .025	.121 .111	.090 .080	1
4	24	.114 .110	.086 .082	.078 .075	.225 .207	.067 .055	.039 .031	.059 .049	.037 .029	.133 .123	.103 .093	1
5	20	.130 .126	.094 .090	.084 .081	.252 .232	.075 .062	.043 .035	.067 .055	.041 .033	.155 .145	.098 .088	2
6	20	.139 .135	.104 .099	.093 .090	.279 .257	.083 .069	.048 .039	.074 .060	.045 .036	.175 .165	.119 .109	2
7	19	.154 .149	.115 .109	.101 .098	.305 .283	.091 .076	.048 .039	.081 .066	.049 .039	.180 .170	.124 .114	2
8	18	.166 .161	.122 .116	.107 .104	.332 .308	.100 .084	.054 .045	.088 .072	.052 .042	.189 .179	.133 .123	2
10	16	.189 .183	.141 .135	.130 .127	.385 .359	.116 .098	.060 .050	.103 .084	.060 .050	.206 .196	.151 .141	2
12	14	.215 .209	.164 .157	.146 .143	.438 .410	.132 .112	.067 .056	.117 .096	.068 .057	.267 .257	.174 .164	3
14	14	.246 .240	.192 .185	.174 .170	.491 .461	.148 .127	.075 .064	.132 .108	.077 .064	.285 .275	.193 .183	3

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.
4. *This type of sheet metal screw thread is sometimes referred to as type "B."





ALCOA

OVAL HEAD
(Z-TYPE)

SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
3/16	.033	.057					
1/4	.040	.066	.085	.102	.152		
5/16	.046	.075	.097	.115	.170		
3/8	.053	.085	.108	.128	.188	.255	.347
1/2	.065	.104	.132	.154	.223	.302	.410
5/8	.078	.123	.155	.181	.259	.349	.473
3/4	.091	.141	.178	.207	.294	.395	.536
7/8	....	.160	.202	.234	.330	.442	.598
1	....	.179	.225	.260	.365	....	.661
1-1/4	....	....	....	.313	.436	....	.787
1-1/2	....	....	....	.365	.508	....	.913
1-3/4	....	....	....	....	.579	....	1.04
2	....	....	....	....	.650	....	1.16

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Oval head sheet metal screws are not normally carried in stock by Alcoa.

ALUMINUM COMPANY OF AMERICA



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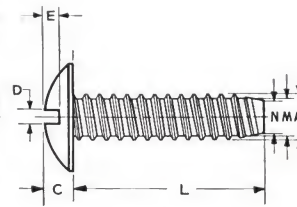
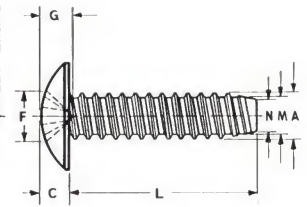
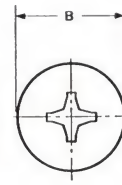
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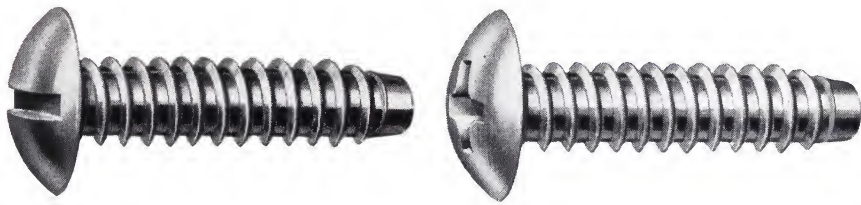
TRUSS HEAD (Z-TYPE*—BLUNT POINT) SHEET METAL SCREWS

Bright Finish**ALCOA 24S-T4 ALLOY****(American Standard B18.6)****Slotted Head****Phillips Recessed Head****DIMENSIONS IN INCHES**

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Point Diam. N	Head Diam. B	Head Height C	Width of Slot D	Depth of Slot E	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088	.064	.055	.194	.053	.031	.031	.101	.071	1
		.084	.060	.052	.180	.044	.023	.022	.091	.061	
3	28	.101	.075	.069	.226	.061	.035	.036	.109	.080	1
		.097	.071	.066	.211	.051	.027	.026	.099	.070	
4	24	.114	.086	.078	.257	.069	.039	.040	.109	.078	1
		.110	.082	.075	.241	.059	.031	.030	.099	.068	
5	20	.130	.094	.084	.289	.078	.043	.045	.125	.095	1
		.126	.090	.081	.272	.066	.035	.034	.115	.085	
6	20	.139	.104	.093	.321	.086	.048	.050	.155	.100	2
		.135	.099	.090	.303	.074	.039	.037	.145	.090	
7	19	.154	.115	.101	.352	.094	.048	.054	.162	.107	2
		.149	.109	.098	.333	.081	.039	.041	.152	.097	
8	18	.166	.122	.107	.384	.102	.054	.058	.170	.115	2
		.161	.116	.104	.364	.088	.045	.045	.160	.105	
10	16	.189	.141	.130	.448	.118	.060	.068	.185	.131	2
		.183	.135	.127	.425	.103	.050	.053	.175	.121	
12	14	.215	.164	.146	.511	.134	.067	.077	.245	.155	3
		.209	.157	.143	.487	.118	.056	.061	.235	.145	
14	14	.246	.192	.174	.573	.150	.075	.087	.260	.170	3
		.240	.185	.170	.546	.133	.064	.070	.250	.160	

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.
4. *This type of sheet metal screw thread is sometimes referred to as type "B."





ALCOA

TRUSS HEAD

(Z-TYPE)

SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
3/16	.042	.073					
1/4	.049	.082	.106	.129	.194		
5/16	.055	.092	.118	.142★	.212		
3/8	.061	.101	.129	.155★	.230	.313	.434
1/2	.074	.120	.153	.182★	.265★	.360	.497
5/8	.087	.139	.176	.208★	.301★	.407★	.560
3/4	.100	.158	.200	.235★	.336★	.453★	.623
7/8	....	.177	.223	.261	.372	.500	.686
1	....	.196	.246	.287	.407	....	.749
1-1/4	....	....	....	.340	.478	....	.874
1-1/2	....	....	....	.393	.549	....	1.00
1-3/4	....	....	....	....	.621	....	1.13
2	....	....	....	....	.692	....	1.25

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.



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ALCOA

PAN HEAD

(BINDING HEAD)

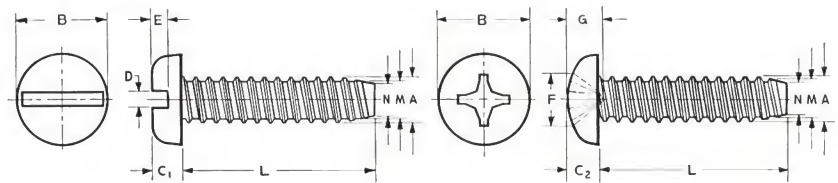
(Z-TYPE*—BLUNT POINT)

SHEET METAL SCREWS

Bright Finish

ALCOA 24S-T4 ALLOY

(American Standard B18.6)



Slotted Head

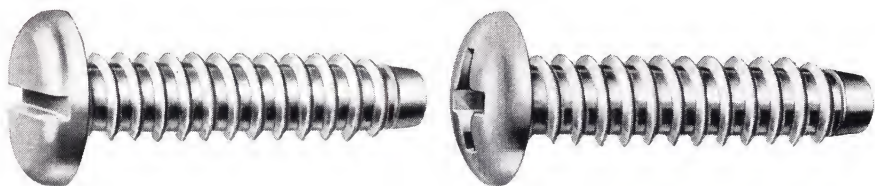
Phillips Recessed Head

DIMENSIONS IN INCHES

Nominal Size	Threads Per Inch	Major Diam. A	Minor Diam. M	Point Diam. N	Head Diam. B	Head Height (Slotted) C ₁	Head Height (Phillips) C ₂	Width of Slot D	Depth of Slot E	Diam. of Recess F	Depth of Recess G	Phillips Head Driver Size No.
2	32	.088 .084	.064 .060	.055 .052	.167 .155	.053 .045	.062 .053	.031 .023	.033 .023	.101 .091	.071 .061	1
3	28	.101 .097	.075 .071	.069 .066	.193 .180	.060 .051	.071 .062	.035 .027	.037 .027	.109 .099	.080 .070	1
4	24	.114 .110	.086 .082	.078 .075	.219 .205	.068 .058	.080 .070	.039 .031	.041 .030	.119 .109	.090 .080	1
5	20	.130 .126	.094 .090	.084 .081	.245 .231	.075 .065	.089 .079	.043 .035	.045 .032	.155 .145	.103 .093	2
6	20	.139 .135	.104 .099	.093 .090	.270 .256	.082 .072	.097 .087	.048 .039	.050 .038	.163 .153	.111 .101	2
7	19	.154 .149	.115 .109	.101 .098	.296 .281	.089 .079	.106 .096	.048 .039	.055 .040	.173 .163	.120 .110	2
8	18	.166 .161	.122 .116	.107 .104	.322 .306	.096 .085	.115 .105	.054 .045	.058 .043	.179 .169	.127 .117	2
10	16	.189 .183	.141 .135	.130 .127	.373 .357	.110 .099	.133 .122	.060 .050	.067 .050	.196 .186	.145 .135	2
12	14	.215 .209	.164 .157	.146 .143	.425 .407	.125 .112	.151 .139	.067 .056	.077 .060	.256 .246	.171 .161	3
14	14	.246 .240	.192 .185	.174 .170	.476 .457	.136 .126	.169 .156	.075 .064	.087 .070	.278 .268	.192 .182	3

1. Shipped in bulk or packed 1 gross per box.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. For recommended hole sizes see page 237, Table No. 16.
4. *This type of sheet metal screw thread is sometimes referred to as type "B."





ALCOA

PAN HEAD

(BINDING HEAD)

(Z-TYPE)

SHEET METAL SCREWS

WEIGHT PER GROSS (Approximate Lbs.)

Length L Inches	Screw Size						
	4	6	7	8	10	12	14
3/16	.043	.074					
1/4	.049★	.083★	.108★	.130	.194		
5/16	.055★	.093★	.119★	.143★	.212★		
3/8	.062★	.102★	.131★	.156★	.230★	.316★	.429
1/2	.075★	.121★	.155★	.183★	.265★	.363★	.491★
5/8	.088	.140★	.178★	.209★	.301★	.409★	.554★
3/4	.100	.159★	.201★	.235★	.336★	.456★	.617★
7/8	....	.178	.225	.262★	.372★	.503	.680★
1	....	.197	.248	.288★	.408★	....	.743★
1-1/4	....	....	....	.341	.479	....	.868
1-1/2	....	....	....	.394	.550	....	.994
1-3/4	....	....	....	....	.621	....	1.12
2	....	....	....	....	.692	....	1.25

1. Weights given are for slotted type heads; weight of Phillips head screws will be slightly less.
2. Items marked "★" are normally kept in stock by Alcoa in both slotted and Phillips type heads.

ALUMINUM COMPANY OF AMERICA



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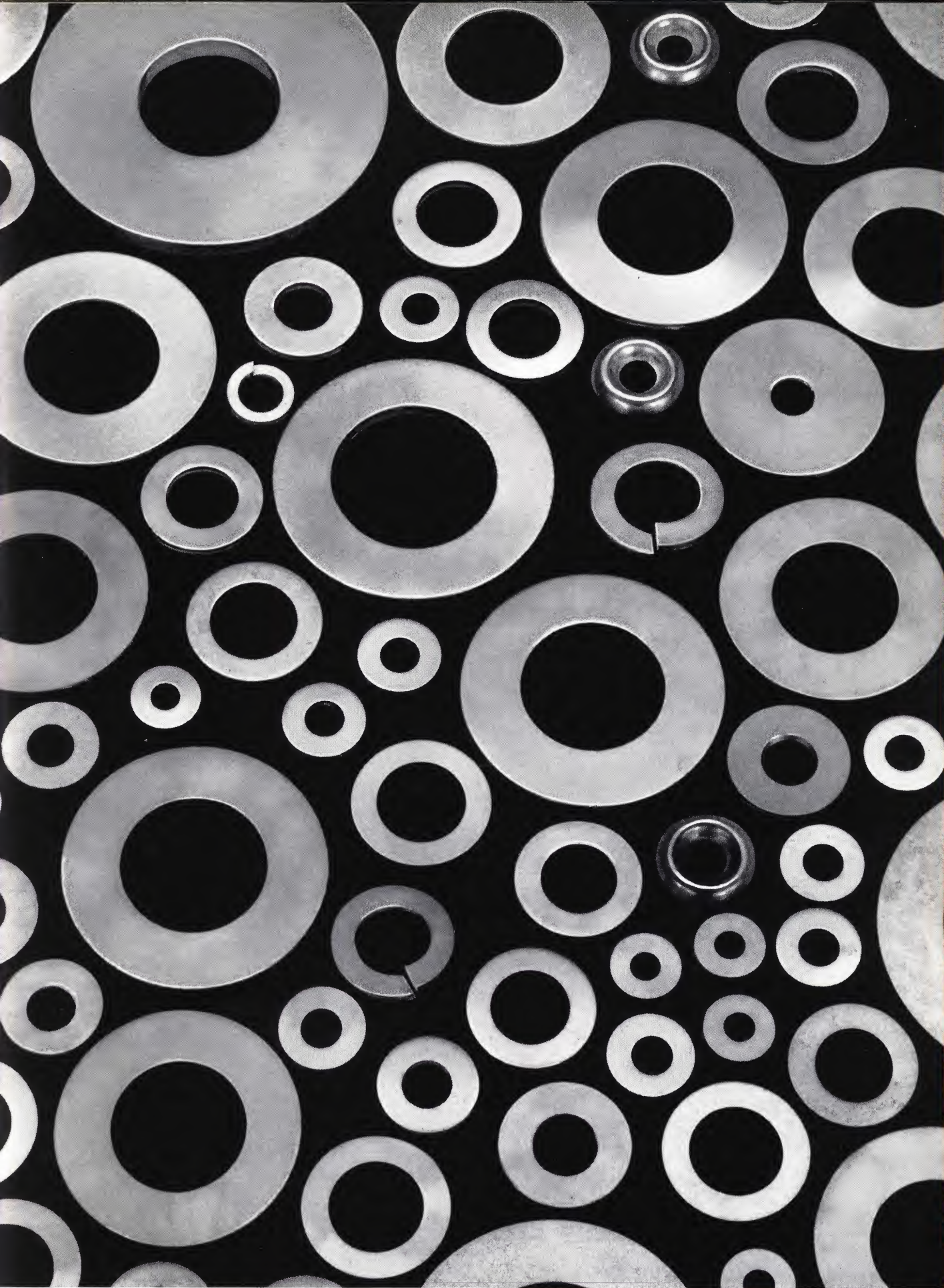
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WASHERS

Alcoa Aluminum plain flat washers are blanked from Alcoa aluminum sheet in sizes to fit all standard screws and bolts and in two thickness series known as "light" and "heavy" from the terminology of the Army-Navy Aircraft drawing upon which their dimensions are based. Flat washers are carried in stock in two alloys; 2S-H18 for most commercial applications where stresses are not severe or for use where some deformation under load is desirable, and Alclad 24S-T4 for numerous aircraft applications or wherever maximum strength and stiffness is required.

Alcoa aluminum finishing washers are designed for use with standard flat or oval countersunk head screws and serve the normal function of a washer with the added characteristic of improved appearance. They are frequently used on such items as furniture where they seat on wood or on leather or fabric coverings.

Screwed or bolted connections may now be secured against vibration by means of aluminum alloy spring lock washers. This new fastening accessory permits vibration resistant joints to be assembled completely with aluminum components.



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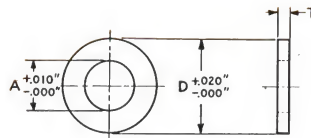
ALCOA

PLAIN WASHERS

**ALCOA ALCLAD 24S-T4
AND 2S-H18 ALLOYS**

(Army-Navy Aircraft Standard AN960)

DIMENSIONS IN INCHES



Screw or Bolt Size		AN Drawing Dash No.		Inside Diam. A	Outside Diam. D	Thickness T		Weights Per 1000 Pieces (Approximate Lbs.)		Packing
Nominal	Decimal	Regular	Light			Regular	Light	Regular	Light	
3	.099	3	3L	7/64	1/4	.032	.016	.128 ★†	.064 ★†	1000 Pieces Per Box
4	.112	4	4L	1/8	5/16	.032	.016	.208 ★†	.104 ★†	
6	.138	6	6L	9/64	3/8	.032	.016	.306 ★†	.153 ★†	
8	.164	8	8L	11/64	3/8	.032	.016	.281 ★†	.141 ★†	
10	.190	10	10L	13/64	7/16	.064	.016	.761 ★†	.191 ★†	
1/4	.250	416	416L	17/64	1/2	.064	.016	.912 ★†	.228 ★†	
5/16	.313	516	516L	21/64	9/16	.064	.016	1.05 ★†	.265 ★†	
3/8	.375	616	616L	25/64	5/8	.064	.016	1.21 ★†	.302 ★†	
7/16	.438	716	716L	29/64	3/4	.064	.016	1.81 ★†	.453 ★†	
1/2	.500	816	816L	33/64	7/8	.064	.016	2.53 ★†	.633 †	
9/16	.563	916	916L	37/64	1-1/16	.064	.016	4.03	1.01†	500 Pieces Per Box
5/8	.625	1016	1016L	41/64	1-3/16	.064	.016	5.07	1.27†	
3/4	.750	1216	1216L	49/64	1-5/16	.091	.016	8.38	1.44†	
7/8	.875	1416	1416L	57/64	1-1/2	.091	.016	10.8	1.84	
1	1.000	1616	1616L	1-1/64	1-3/4	.091	.016	15.0	2.57	100 Pieces Per Box
		1716	1716L	1-5/64	1-13/16	.091	.016	15.3	2.69	
		2116	2116L	1-21/64	2-1/16	.091	.016	17.9	3.16	
		2616	2616L	1-41/64	2-3/8	.091	.016	21.3	3.74	
		3016	3016L	1-57/64	2-5/8	.091	.016	24.0	4.20	
		3616	3616L	2-17/64	3	.091	.016	27.9	4.90	
		4016	4016L	2-33/64	3-1/4	.091	.016	30.5	5.38	

- Items marked "★" normally carried in stock by Alcoa in 2S-H18 alloy.
Items marked "†" normally carried in stock by Alcoa in Alclad 24S-T4 alloy.
- Packed in bulk or boxed as indicated above.
- Will be furnished with Alcoa's Alumilite finish, if specified.

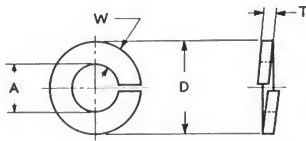


STANDARD SPRING LOCK WASHERS

(MEDIUM SECTION)

ALCOA 75S-T6 ALLOY

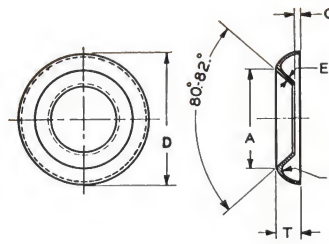
(ASA and SAE Standard)



DIMENSIONS IN INCHES

Screw or Bolt Size		Clearance		Min. Inside Diam. A	Max. Outside Diam. D	Washer Section Min.		Weight Per 1000 Pieces (Approx. Lbs.)	Packing
Nominal	Actual	Min.	Max.			Width W	Thickness T		
2	.086	.002	.011	.088	.175	.035	.020	.036	
3	.099	.002	.011	.102	.198	.040	.025	.057	
4	.112	.003	.012	.115	.212	.040	.025	.063	
5	.125	.003	.012	.128	.239	.047	.031	.100	
6★	.138	.003	.013	.141	.251	.047	.031	.106	1000 Pieces Per Box
8★	.164	.004	.014	.168	.296	.055	.040	.188	
10★	.190	.004	.015	.194	.337	.062	.047	.283	
12	.216	.005	.016	.221	.380	.070	.056	.424	
1/4★	.250	.005	.017	.255	.493	.109	.062	.874	
5/16★	.313	.006	.020	.319	.591	.125	.078	1.53	
3/8★	.375	.007	.023	.382	.688	.141	.094	2.44	
7/16	.438	.008	.026	.446	.784	.156	.109	3.59	
1/2	.500	.009	.029	.509	.879	.171	.125	5.09	
9/16	.563	.010	.032	.573	.979	.188	.141	7.04	500 Pieces Per Box
5/8	.625	.011	.035	.636	1.086	.203	.156	9.57	
3/4	.750	.013	.041	.763	1.279	.234	.188	15.7	
7/8	.875	.015	.047	.890	1.474	.266	.219	23.9	
1	1.000	.017	.053	1.017	1.672	.297	.250	34.8	100 Pieces Per Box

1. The thickness of the section at the inside periphery is slightly greater than the thickness at the outer periphery. T represents the minimum mean thickness.
2. On the washer section thickness (T) the following plus tolerances apply: No. 2 to and including No. 12, +.006; 1/4" to and including 5/8", +.010; 3/4" and larger, +.020".
3. Items marked "★" are normally carried in stock by Alcoa.
4. Packed in bulk or boxed as indicated above.

ALCOA**FINISHING WASHERS****(HOLLOW COUNTERSUNK TYPE)****Bright Finish****ALCOA 3S-H14 ALLOY****DIMENSIONS IN INCHES**

Size	A		D		T		C	E	Radius F	Weight Per 1000 Pieces (Approx. Lbs.)
	Max.	Min.	Max.	Min.	Max.	Min.				
6★	.303	.293	.438	.428	.095	.082	.015	.014	.028	.267
8★	.357	.347	.520	.510	.102	.092	.015	.014	.036	.434
10★	.437	.412	.580	.570	.120	.110	.015	.014	.036	.601
12★	.470	.455	.635	.630	.130	.120	.031	.014	.036	.802
14★	.515	.500	.700	.690	.130	.120	.031	.014	.036	.902

1. Washer size corresponds to size of standard flat or oval countersunk head screw with which washer should be used.
2. Packed in bulk or boxed 1000 per box.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Items marked "★" are normally carried in stock by Alcoa.

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RIVETS AND NAILS

Riveting is the most commonly used method for joining aluminum, particularly the structural alloys which depend upon heat treatment for their high mechanical properties. Alcoa aluminum rivets by the billions literally held together the United States air forces during World War II and are performing thousands of uses in peacetime service from holding handles on cooking pots to assembling stream-lined trains.

Aluminum alloy rivets may be made from practically any of the wrought aluminum alloys, but the following alloys commercially available in rivets, adequately fill the requirements as regards range of properties and driving characteristics: 2S (commercially pure aluminum) A17S, 17S, 24S, and 53S. Information on the design of riveted joints, selection of aluminum rivets, and driving methods for aluminum riveted joints is available in the booklet "Riveting Alcoa Aluminum," which may be obtained by writing to the Aluminum Company of America, Pittsburgh, Pennsylvania.

Alcoa aluminum rivets are supplied in a large number of head styles frequently used in aircraft and general riveting work. Each rivet carries a characteristic alloy identification mark, as explained in detail elsewhere, to prevent any possibility of alloys being inadvertently mixed at the point of use. Alcoa rivets may be supplied in a variety of tempers in some cases and with protective or identifying Alumilite coatings where required.

In addition to the usual variety of solid rivets, Alcoa produces tubular rivets for particular types of service. Aluminum nails and escutcheon pins are also manufactured by Alcoa and find wide use where appearance or corrosion resistance are prime requisites. The tremendous expansion in the use of aluminum sheet for roofing and siding has created a large market for aluminum nails to fasten this material strongly and permanently to supporting members.



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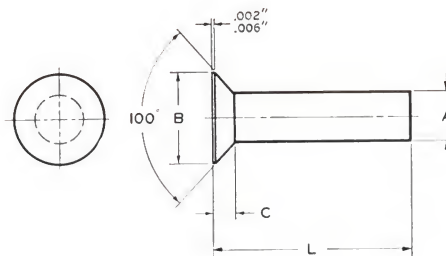
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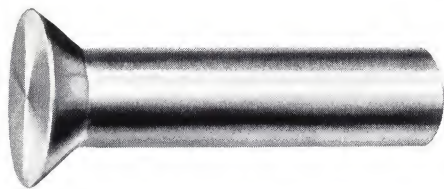
STANDARD 100° FLAT COUNTERSUNK HEAD RIVETS



DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C
Fraction	Decimal		
1/16	.062	.105	.022
3/32	.094	.170	.036
1/8	.125	.216	.042
5/32	.156	.278	.055
3/16	.187	.344	.070
1/4	.250	.467	.095
5/16	.312	.555	.106
3/8	.375	.685	.134

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Where so specified on customer's order these rivets will be fabricated to fulfill the requirements of Army-Navy Aeronautical specification AN426 insofar as applicable.



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STANDARD 100° FLAT COUNTERSUNK HEAD RIVETS

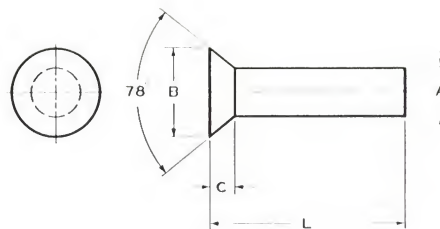
APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter — Inches							
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	1/4 0.250	5/16 0.312	3/8 0.375
1/8	22,727							
3/16	15,873	6211						
1/4	12,195	4901	2754	1677	1094			
5/16	9900	4032	2267	1394	917			
3/8	8333	3424	1930	1194	793	413		
7/16	7194	2976	1677	1043	699	366	239	
1/2	6329	2638	1485	925	621	328	215	140
9/16	5649	2364	1331	833	561	298	194	127
5/8	5102	2141	1207	757	512	273	178	117
11/16	4651	1956	1103	694	469	251	164	108
3/4	4273	1805	1017	641	434	234	152	101
7/8	3676	1557	877	555	378	204	132	88
1	3225	1371	775	490	334	181	117	79
1-1/8	2873	1223	689	438	299	163	105	71
1-1/4	2577	1106	625	395	271	148	95	65
1-3/8	....	1008	568	361	248	135	88	59
1-1/2	....	925	523	332	228	125	81	55
1-3/4	....	798	444	286	197	108	70	47
2	....	701	392	251	173	95	61	42
2-1/2	....	....	315	200	139	77	50	34
3	....	....	264	168	117	64	42	29
3-1/2	....	....	....	145	100	55	35	24



ALCOA

STANDARD 78° FLAT COUNTERSUNK HEAD RIVETS



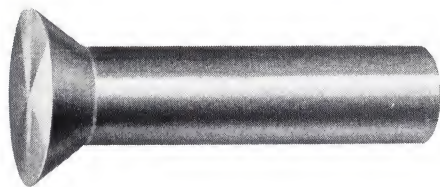
Approximate Proportions: A = Nominal Diameter; B = 1.81A; C = .5A

DIMENSIONS IN INCHES

Nominal Diameter		B	C
Fraction	Decimal		
1/16	.053	.096	.026
	.062	.112	.031
	.072	.130	.036
5/64	.078	.141	.039
	.084	.152	.042
3/32	.094	.170	.047
	.103	.186	.051
7/64	.109	.198	.055
	.113	.205	.056
	.120	.217	.060
1/8	.125	.225	.062
	.134	.243	.067
9/64	.141	.255	.070
	.148	.268	.074
5/32	.156	.282	.078
	.165	.299	.082
11/64	.172	.311	.086
	.180	.326	.090
3/16	.187	.339	.094
	.193	.349	.096
13/64	.203	.368	.101
7/32	.219	.396	.109
15/64	.234	.424	.117
1/4	.250	.452	.125
9/32	.281	.509	.141
5/16	.312	.565	.156
3/8	.375	.678	.187
7/16	.437	.792	.219
1/2	.500	.905	.250
9/16	.562	1.018	.281
5/8	.625	1.131	.312
3/4	.750	1.357	.375

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the following specifications insofar as applicable.
 - (a) Army Navy Aeronautical Specification AN425.
 - (b) Navy Department Specification 43R5g type 7.





ALCOA

STANDARD 78° FLAT COUNTERSUNK HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter — Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	34,483	12,937	6369												
3/32	25,840	10,095	5102	2976	1883										
1/8	20,661	8264	4274	2525	1618	1110	797	592							
3/16	14,771	6098	3205	1934	1261	877	641	481	372	236					
1/4	11,494	4808	2571	1567	1034	730	535	405	314	203	139	99.6			
5/16	9434	3984	2146	1318	877	621	459	350	273	178	123	88.5	66.2	51.0	32.2
3/8	7937	3390	1838	1136	763	541	402	308	242	158	110	79.9	60.2	46.5	29.5
7/16	6897	2956	1610	1000	671	478	357	275	216	142	99.5	72.5	55.0	42.6	27.2
1/2	6098	2618	1433	893	602	431	322	248	196	130	90.9	66.7	50.1	39.4	25.4
9/16	5444	2353	1289	806	543	391	292	226	179	119	84.0	61.7	46.9	36.6	23.7
5/8	4926	2132	1172	735	498	357	268	207	164	110	77.5	57.1	43.7	34.1	22.2
11/16	4504	1953	1075	676	459	330	248	192	152	102	72.5	53.5	40.8	32.1	20.9
3/4	4132	1799	990	625	424	306	230	179	142	95.2	67.6	50.3	38.5	30.2	19.8
7/8	3571	1555	862	541	369	267	201	156	125	84.0	60.2	44.6	34.2	27.0	17.8
1	3135	1370	758	478	328	237	179	139	111	75.2	53.8	40.2	31.0	24.4	16.2
1-1/8	2797	1224	680	429	294	213	161	126	101	68.0	48.8	36.5	28.2	22.4	14.9
1-1/4	2524	1106	613	389	267	194	147	115	91.7	62.1	44.6	33.6	25.9	20.6	13.7
1-3/8	.....	1009	562	356	244	177	134	105	84.0	57.3	41.2	31.0	24.0	19.0	12.8
1-1/2	.....	927	515	328	225	164	124	97.1	78.1	53.2	38.2	28.7	22.3	17.8	11.9
1-3/4	.....	799	444	282	195	142	108	84.0	67.6	46.3	33.4	29.4	20.0	15.6	10.5
2	.....	701	392	249	171	125	95.2	74.6	60.0	41.0	29.7	22.4	17.5	13.9	9.4
2-1/4	.....	.....	349	222	153	112	85.5	66.7	53.8	36.8	26.7	20.2	15.7	12.6	8.5
2-1/2	.....	.....	315	200	138	101	76.9	60.2	48.5	33.3	24.2	18.3	14.3	11.5	7.8
2-3/4	.....	.....	287	183	126	92.2	70.4	55.2	44.4	30.5	22.2	16.8	13.1	10.5	7.1
3	.....	.....	264	168	116	84.7	64.5	50.8	41.0	28.1	20.4	15.5	12.1	9.7	6.6
3-1/4	.....	.....	.....	155	107	78.7	59.9	47.0	37.9	26.1	19.0	14.4	11.3	9.1	6.2
3-1/2	.....	.....	.....	145	99.8	73.0	55.6	43.9	35.3	24.3	17.7	13.4	10.5	8.5	5.8
3-3/4	.....	.....	.....	135	93.5	68.5	52.1	41.0	33.1	22.8	16.6	12.6	9.9	7.9	5.4
4	.....	.....	.....	127	87.7	64.1	49.0	38.5	31.1	21.4	15.6	11.9	9.3	7.5	5.1
4-1/4	.....	.....	.....	.....	82.6	60.6	46.1	36.4	29.3	20.2	14.7	11.2	8.8	7.1	4.9
4-1/2	.....	.....	.....	.....	78.1	57.1	43.7	34.4	27.8	19.1	14.0	10.6	8.3	6.7	4.6
4-3/4	.....	.....	.....	.....	74.1	54.3	41.5	32.6	26.3	18.1	.....	.....	.....	.....	.....
5	70.4	51.5	39.4	31.1	25.1	17.3
5-1/4	49.3	37.6	29.6	23.9	16.5
5-1/2	35.8	28.2	22.8	15.8



Misc.
Fasteners,
Accessories

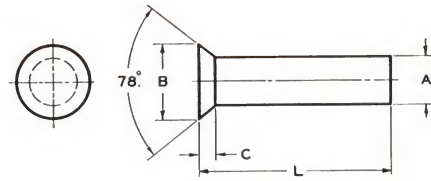
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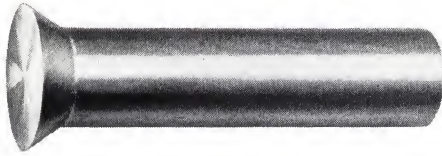
STANDARD MODIFIED 78° FLAT COUNTERSUNK HEAD RIVETS



DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C
Fraction	Decimal		
3/32	.094	.149	.034
1/8	.125	.200	.046
5/32	.156	.250	.058
3/16	.187	.299	.069
1/4	.250	.386	.084
5/16	.312	.474	.100
3/8	.375	.561	.115

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.



ALCOA

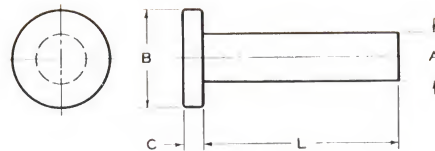
STANDARD MODIFIED 78° FLAT COUNTERSUNK HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches						
	3/32	1/8	5/32	3/16	1/4	5/16	3/8
1/16	16700	8400					
3/32	12200	6330	3830	2510			
1/8	9620	5100	3120	2060	1130		
3/16	6760	3650	2270	1520	833	521	353
1/4	5210	2850	1780	1200	662	417	283
5/16	4260	2340	1470	995	549	347	237
3/8	3580	1980	1250	847	469	298	203
7/16	3100	1720	1080	741	412	260	178
1/2	2730	1510	962	658	365	231	158
9/16	2440	1360	862	588	328	208	143
5/8	2200	1230	781	535	298	189	130
11/16	2010	1120	714	490	272	173	119
3/4	1850	1030	658	450	251	160	110
7/8	1590	893	565	391	217	139	95.2
1	1400	781	498	344	192	122	84.0
1-1/8	1240	699	444	307	171	109	75.2
1-1/4	1120	629	402	278	155	99.0	68.0
1-3/8	1020	575	366	253	141	90.1	62.1
1-1/2	935	526	337	233	130	83.3	57.1
1-3/4	806	452	290	200	112	71.4	49.5
2	704	397	254	176	98.0	62.9	43.5
2-1/4	....	353	227	157	87.7	56.2	38.8
2-1/2	....	318	204	142	79.4	50.8	35.0
2-3/4	....	290	186	129	71.9	46.1	31.8
3	....	266	171	118	66.2	42.4	29.2
3-1/4	....	....	158	109	61.0	39.2	27.1
3-1/2	....	....	147	102	56.8	36.4	25.2
3-3/4	....	....	137	95.2	53.2	34.0	23.5
4	....	....	129	89.3	49.8	31.9	22.1
4-1/4	....	....	....	84.0	46.9	30.1	20.8
4-1/2	79.4	44.4	28.4	19.6
4-3/4	75.2	42.0	27.0	18.6
5	71.4	40.0	25.6	17.7
5-1/4	38.2	24.4	16.9
5-1/2	36.4	23.3	16.1

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STANDARD FLAT HEAD RIVETS

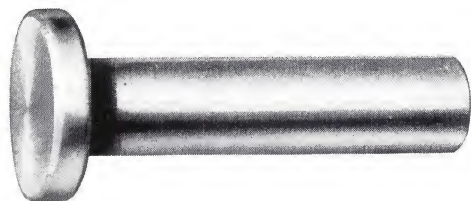


Approximate Proportions: $A = \text{Nominal Diameter}$; $B = 2A$; $C = .4A$

DIMENSIONS IN INCHES

Nominal Diameter		B	C
Fraction	Decimal		
1/16	.053	.106	.021
	.062	.125	.025
	.072	.144	.029
5/64	.078	.156	.031
	.084	.168	.034
3/32	.094	.187	.038
	.103	.206	.041
7/64	.109	.219	.044
	.113	.226	.045
	.120	.240	.048
1/8	.125	.250	.050
	.134	.268	.054
9/64	.141	.281	.056
	.148	.296	.059
5/32	.156	.312	.062
	.165	.330	.066
11/64	.172	.344	.069
	.180	.360	.072
3/16	.187	.375	.075
	.193	.386	.077
13/64	.203	.406	.081
7/32	.219	.437	.087
15/64	.234	.469	.094
1/4	.250	.500	.100
9/32	.281	.562	.112
5/16	.312	.625	.125
3/8	.375	.750	.150
7/16	.437	.875	.175
1/2	.500	1.000	.200
9/16	.562	1.125	.225
5/8	.625	1.250	.250
3/4	.750	1.500	.300

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the following specifications insofar as applicable.
 - (a) Army Navy Aeronautical Specification AN442.
 - (b) Navy Department Specification 43R5g type 4.



ALCOA

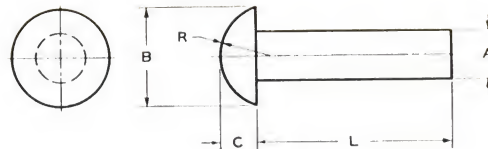
STANDARD FLAT HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter — Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	20,190	6723	3079												
3/32	16,895	5865	2751	1510	907										
1/8	14,522	5202	2487	1384	840	554	385								
3/16	11,338	4242	2086	1185	733	490	344	251	188	114					
1/4	9299	3581	1796	1037	650	439	311	228	172	106	69	48			
5/16	7882	3098	1577	921	584	398	284	210	159	98	65	45	33	25	
3/8	6839	2730	1405	829	530	363	261	194	148	92	61	43	31	24	14
7/16	6041	2440	1268	754	485	335	241	180	138	87	58	41	30	23	14
1/2	5409	2206	1154	691	448	310	224	168	129	82	55	39	29	22	13
9/16	4897	2013	1060	637	415	289	210	158	122	77	52	37	27	21	13
5/8	4473	1851	980	592	387	270	197	149	115	73	50	35	26	20	12
11/16	4117	1713	911	552	363	254	186	140	109	70	48	34	25	19	12
3/4	3814	1594	851	518	341	240	176	133	103	67	45	33	24	19	12
7/8	3323	1400	752	460	305	215	158	121	94	61	42	30	23	17	11
1	2945	1248	673	414	276	195	144	110	86	56	39	28	21	16	10
1-1/8	2644	1126	610	376	252	179	132	101	80	52	36	26	20	15	9.7
1-1/4	2398	1025	557	345	231	165	122	94	74	49	34	25	19	14	9.2
1-3/8	....	941	513	319	214	153	114	88	69	46	32	23	18	14	8.7
1-1/2	....	870	475	296	199	143	106	82	65	43	30	22	17	13	8.3
1-3/4	....	755	414	259	175	126	94	73	58	38	27	20	15	12	7.6
2	....	668	367	230	156	112	84	65	52	35	24	18	14	11	7.0
2-1/4	....	....	330	207	141	101	76	59	47	32	22	17	13	9.9	6.5
2-1/2	....	....	293	188	128	93	70	54	43	29	21	15	12	9.2	6.1
2-3/4	....	....	274	172	118	85	64	50	40	27	19	14	11	8.6	5.7
3	....	....	253	159	109	79	59	46	37	25	18	13	10	8.1	5.3
3-1/4	....	....	....	148	101	73	55	43	35	23	17	13	9.6	7.6	5.0
3-1/2	....	....	....	138	94	69	52	40	32	22	16	12	9.1	7.2	4.8
3-3/4	....	....	....	129	89	64	49	38	30	21	15	11	8.6	6.8	4.5
4	....	....	....	122	84	61	46	36	29	20	14	11	8.1	6.5	4.3
4-1/4	....	....	....	....	79	57	43	34	27	19	13	10	7.8	6.2	4.1
4-1/2	....	....	....	....	75	54	41	32	26	18	13	9.5	7.4	5.9	3.9
4-3/4	....	....	....	....	71	52	39	31	25	17					
5	....	....	....	....	68	49	38	29	24	16					
5-1/4	....	....	....	....	....	47	36	28	23	15					
5-1/2	....	....	....	....	....	....	34	27	22	15					

ALCOA

STANDARD ROUND HEAD RIVETS



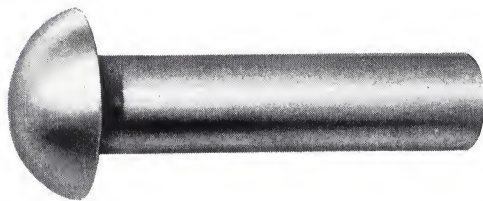
Approximate Proportions: A = Nominal Diameter; $B = 2A$; $C = .75A$; $R = 1.042A$

DIMENSIONS IN INCHES

Nominal Diameter		B	C	R
Fraction	Decimal			
1/16	.053	.106	.040	.055
	.062	.125	.047	.065
	.072	.144	.054	.075
5/64	.078	.156	.059	.081
	.084	.168	.063	.088
3/32	.094	.187	.070	.098
	.103	.206	.077	.107
7/64	.109	.219	.082	.114
	.113	.226	.085	.118
	.120	.240	.090	.125
1/8	.125	.250	.094	.130
	.134	.268	.100	.140
9/64	.141	.281	.105	.147
	.148	.296	.111	.154
5/32	.156	.312	.117	.163
	.165	.330	.124	.172
11/64	.172	.344	.129	.179
	.180	.360	.135	.188
3/16	.187	.375	.141	.195
	.193	.386	.145	.201
13/64	.203	.406	.152	.212
7/32	.219	.437	.164	.228
15/64	.234	.469	.176	.244
1/4	.250	.500	.188	.260
9/32	.281	.562	.211	.293
5/16	.312	.625	.234	.326
3/8	.375	.750	.281	.391
7/16	.437	.875	.328	.456
1/2	.500	1.000	.375	.521
9/16	.562	1.125	.422	.586
5/8	.625	1.250	.469	.651
3/4	.750	1.500	.562	.781

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the following specifications insofar as applicable.
 - (a) Army Navy Aeronautical Specification AN430.
 - (b) Navy Department Specification 43R5g type 3.





ALCOA

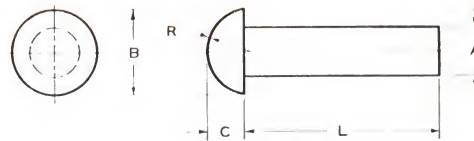
STANDARD ROUND HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	18,882	6223	2833												
3/32	15,969	5480	2553	1395	834										
1/8	13,833	4897	2324	1286	778	511	354								
3/16	10,913	4037	1970	1113	685	456	319	232	174	105					
1/4	9012	3434	1709	981	612	412	291	213	160	98	64	44			
5/16	7675	2988	1510	877	553	375	267	197	149	92	60	42	30	23	
3/8	6683	2644	1352	793	505	344	246	182	139	86	57	40	29	22	13
7/16	5918	2371	1224	724	464	318	229	170	130	81	54	38	28	21	13
1/2	5310	2149	1118	666	429	296	214	160	122	77	51	36	27	20	12
9/16	4816	1966	1029	616	399	277	200	150	116	73	49	35	26	19	12
5/8	4406	1811	953	573	373	260	189	142	109	69	47	33	25	19	11
11/16	4060	1679	888	536	351	245	178	134	104	66	45	32	24	18	11
3/4	3764	1564	830	504	330	231	169	127	99	63	43	31	23	17	11
7/8	3286	1377	736	449	296	208	153	116	90	58	40	29	21	16	10
1	2916	1230	661	405	269	190	140	106	83	54	37	27	20	15	10
1-1/8	2620	1111	600	369	246	174	129	98	77	50	35	25	19	14	9.1
1-1/4	2379	1013	549	339	226	161	119	91	72	47	32	24	18	14	8.7
1-3/8	.....	931	505	313	210	149	111	85	67	44	31	22	17	13	8.3
1-1/2	.....	861	469	291	196	140	104	80	63	41	29	21	16	12	7.9
1-3/4	.....	749	410	255	172	123	92	71	56	37	26	19	15	11	7.3
2	.....	663	364	227	154	110	83	64	51	34	24	17	13	10	6.7
2-1/4	.....	.....	327	205	139	100	75	58	46	31	22	16	12	10	6.3
2-1/2	.....	.....	297	186	127	91	69	53	42	28	20	15	11	8.9	5.9
2-3/4	.....	.....	272	171	116	84	63	49	39	26	19	14	11	8.4	5.5
3	.....	.....	251	158	108	78	59	46	36	24	17	13	10	7.9	5.2
3-1/4	.....	.....	.....	147	100	72	55	43	34	23	16	12	9.4	7.4	4.9
3-1/2	.....	.....	.....	137	94	68	51	40	32	22	15	12	8.9	7.0	4.6
3-3/4	.....	.....	.....	128	88	64	48	38	30	20	15	11	8.4	6.6	4.4
4	.....	.....	.....	121	83	60	45	35	28	19	14	10	8.0	6.3	4.2
4-1/4	.....	.....	.....	.....	78	57	43	34	27	18	13	9.8	7.6	6.0	4.0
4-1/2	.....	.....	.....	.....	74	54	41	32	26	17	12	9.4	7.3	5.8	3.8
4-3/4	.....	.....	.....	.....	71	51	39	30	24	17					
5	.....	.....	.....	.....	67	49	37	29	23	16					
5-1/4	.....	.....	.....	.....	.....	47	35	28	22	15					
5-1/2	.....	.....	.....	.....	.....	.....	34	27	21	15					

ALCOA

STANDARD BUTTON HEAD RIVETS

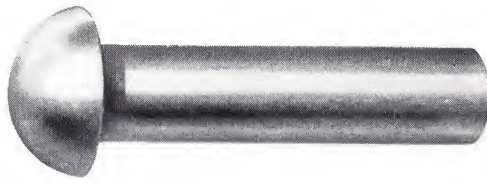


Approximate Proportions: A = Nominal Diameter; B = 1.75A; C = .75A; R = .885A

DIMENSIONS IN INCHES

Nominal Diameter		B	C	R
Fraction	Decimal			
1/16	.053	.093	.040	.047
	.062	.109	.047	.055
	.072	.126	.054	.064
5/64	.078	.137	.059	.069
	.084	.147	.063	.074
3/32	.094	.164	.070	.083
	.103	.180	.077	.091
7/64	.109	.191	.082	.097
	.113	.198	.085	.100
	.120	.210	.090	.106
1/8	.125	.219	.094	.111
	.134	.234	.100	.119
9/64	.141	.246	.105	.125
	.148	.259	.111	.131
5/32	.156	.273	.117	.138
	.165	.289	.124	.146
11/64	.172	.301	.129	.152
	.180	.315	.135	.159
3/16	.187	.328	.141	.166
	.193	.338	.145	.171
13/64	.203	.355	.152	.180
7/32	.219	.383	.164	.194
15/64	.234	.410	.176	.207
1/4	.250	.437	.188	.221
9/32	.281	.492	.211	.249
5/16	.312	.547	.234	.277
3/8	.375	.656	.281	.332
7/16	.437	.766	.328	.387
1/2	.500	.875	.375	.442
9/16	.562	.984	.422	.498
5/8	.625	1.094	.469	.553
3/4	.750	1.312	.562	.664

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the Navy Department Specification 43R5g type 6 or B-1 insofar as applicable.



ALCOA

STANDARD BUTTON HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter - Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	21,276														
3/32	17,543	6410	2941												
1/8	15,151	5617	2645												
3/16	11,764	4524	2192	1262											
1/4	9615	3802	1876	1096	699	471	331	244	186	114					
5/16	8130	3267	1636	970	621	423	300	223	170	105					
3/8	7042	2865	1453	869	561	386	274	205	157	98					
7/16	6211	2551	1305	787	512	353	253	190	146	92					
1/2	5555	2298	1186	719	471	326	234	176	136	86	58	41	30	23	
9/16	5025	2092	1085	657	434	303	218	165	128	81	55	39	29	22	
5/8	4587	1923	1002	609	404	283	205	155	121	77	52	37	27	21	
11/16	4219	1776	925	568	378	265	192	146	114	73	50	35	26	20	
3/4	3906	1650	869	531	354	250	182	138	108	69	48	34	25	19	12
7/8	3401	1447	763	471	316	223	163	125	98	63	44	31	23	18	11
1	3012	1287	684	423	284	202	148	113	89	58	40	29	22	17	10
1-1/8	2666	1140	621	383	257	183	136	105	82.0	54.1	37.6	27.5	20.7	16.0	10.2
1-1/4	2417	1037	565	351	236	169	126	97.1	76.3	50.3	35.1	25.7	19.5	15.1	9.7
1-3/8	....	951	521	324	218	156	117	90.1	70.9	47.0	32.9	24.2	18.3	14.3	9.2
1-1/2	....	879	481	300	203	146	109	84.0	66.2	44.0	31.0	22.8	17.3	13.5	8.7
1-3/4	....	762	418	262	178	128	96.2	74.1	58.8	39.2	27.8	20.5	15.6	12.2	7.9
2	....	673	370	233	158	114	85.5	66.7	52.9	35.3	25.1	18.6	14.3	11.2	7.3
2-1/4	....	....	333	209	142	103	77.5	60.2	47.9	32.3	22.9	17.0	13.1	10.3	6.8
2-1/2	....	....	302	190	130	93.5	70.9	55.0	43.9	29.6	21.1	15.7	12.1	9.5	6.3
2-3/4	....	....	276	174	119	86.2	64.9	50.8	40.5	27.3	19.5	14.6	11.2	8.9	5.9
3	....	....	254	161	110	79.4	60.2	47.0	37.5	25.4	18.2	13.6	10.5	8.3	5.5
3-1/4	....	....	....	149	102	74.1	55.9	43.7	35.0	23.7	17.0	12.7	9.8	7.8	5.2
3-1/2	....	....	....	139	95.2	69.0	52.4	41.0	32.8	22.2	16.0	12.0	9.3	7.4	4.9
3-3/4	....	....	....	130	89.3	64.9	49.3	38.5	30.8	21.0	15.1	11.3	8.8	6.9	4.7
4	....	....	....	123	84.0	61.0	46.3	36.2	29.1	19.8	14.3	10.7	8.3	6.6	4.4
4-1/4	....	....	....	....	79.4	57.8	43.9	34.4	27.6	18.8	13.5	10.2	7.9	6.3	4.2
4-1/2	....	....	....	....	75.2	55.0	41.7	32.6	26.2	17.8	12.9	9.7	7.5	6.0	4.0
4-3/4	....	....	....	....	71.4	52.1	39.4	31.0	24.9	17.0					
5	....	....	....	....	68.0	49.8	37.7	29.6	23.8	16.2					
5-1/4	....	....	....	....	....	47.4	36.0	28.3	22.7	15.5					
5-1/2	....	....	....	....	....	....	34.5	27.0	21.7	14.9					

Misc.
Fasteners,
Accessories

10

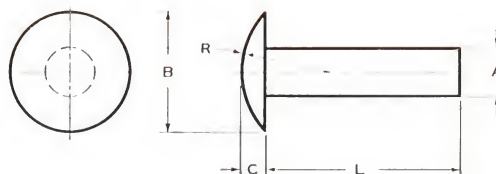
Design
Information
Tables

11



ALCOA

STANDARD BRAZIER HEAD RIVETS

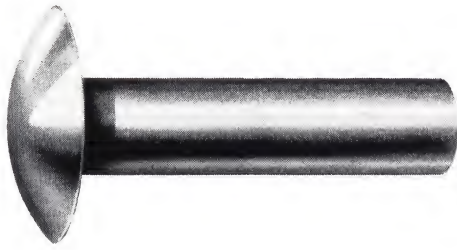


Approximate Proportions: $A = \text{Nominal Diameter}$; $B = 2.5A$; $C = .5A$; $R = 1.8125A$

DIMENSIONS IN INCHES

Nominal Diameter		B	C	R
Fraction	Decimal			
1/16	.053	.132	.026	.096
	.062	.156	.031	.113
	.072	.180	.036	.130
5/64	.078	.195	.039	.142
	.084	.210	.042	.152
3/32	.094	.234	.047	.170
	.103	.257	.051	.187
7/64	.109	.273	.055	.198
	.113	.282	.056	.205
	.120	.300	.060	.217
1/8	.125	.312	.062	.227
	.134	.335	.067	.243
9/64	.141	.352	.070	.255
	.148	.370	.074	.268
5/32	.156	.391	.078	.283
	.165	.412	.082	.299
11/64	.172	.430	.086	.312
	.180	.450	.090	.326
3/16	.187	.469	.094	.340
	.193	.482	.096	.350
13/64	.203	.508	.102	.368
7/32	.219	.547	.109	.396
15/64	.234	.586	.117	.425
1/4	.250	.625	.125	.453
9/32	.281	.703	.141	.510
5/16	.312	.781	.156	.566
3/8	.375	.937	.187	.680
7/16	.437	1.094	.219	.793
1/2	.500	1.250	.250	.906
9/16	.562	1.406	.281	1.020
5/8	.625	1.562	.312	1.133
3/4	.750	1.875	.375	1.359

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the following specifications insofar as applicable.
 - (a) Army Navy Aeronautical Specification AN455.
 - (b) Navy Department Specification 43R5g type 2.



ALCOA

STANDARD BRAZIER HEAD RIVETS

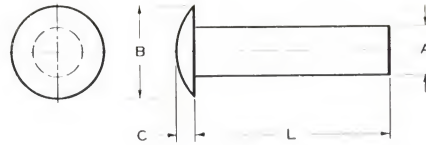
APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	19,833	6587	3012												
3/32	16,644	5761	2698	1479	887										
1/8	14,337	5120	2443	1357	823	543	377								
3/16	11,225	4187	2055	1166	720	481	337	246	184	112					
1/4	9223	3542	1773	1022	640	432	305	224	169	103	68	47			
5/16	7827	3069	1559	910	576	392	279	206	156	97	64	45	32	24	
3/8	6798	2708	1391	820	523	358	257	191	145	90	60	42	31	23	14
7/16	6009	2422	1256	748	480	330	238	177	136	85	57	40	29	22	13
1/2	5383	2191	1145	684	443	306	222	166	127	80	54	38	28	21	13
9/16	4876	2000	1052	632	411	286	207	155	120	76	51	36	27	20	13
5/8	4456	1840	973	587	384	268	195	147	113	72	49	35	26	20	12
11/16	4102	1704	905	548	360	252	184	139	108	69	47	33	25	19	12
3/4	3800	1586	845	514	338	237	174	132	102	66	45	32	24	18	11
7/8	3314	1394	748	457	303	213	157	119	93	60	41	30	22	17	11
1	2937	1243	670	412	274	194	143	109	85	56	38	28	21	16	10
1-1/8	2638	1122	607	375	250	178	131	100	79	52	36	26	19	15	9.5
1-1/4	2393	1022	555	343	230	164	122	93	73	48	33	24	18	14	9.0
1-3/8	.....	939	511	317	213	152	113	87	68	45	31	23	17	13	8.6
1-1/2	.....	868	474	295	198	142	106	81	64	42	30	22	16	13	8.2
1-3/4	.....	754	413	258	174	125	93	72	57	38	27	20	15	12	7.5
2	.....	666	366	229	155	112	84	65	51	34	24	18	14	11	6.9
2-1/4	.....	.....	329	206	140	101	76	59	47	31	22	16	13	9.9	6.4
2-1/2	.....	.....	299	188	128	92	69	54	43	29	20	15	12	9.2	6.0
2-3/4	.....	.....	273	172	117	85	64	50	40	27	19	14	11	8.6	5.6
3	.....	.....	252	159	108	78	59	46	37	25	18	13	10	8.0	5.3
3-1/4	.....	.....	.....	148	100	73	55	43	34	23	17	12	9.6	7.6	5.0
3-1/2	.....	.....	.....	138	94	68	52	40	32	22	16	12	9.0	7.1	4.7
3-3/4	.....	.....	.....	129	88	64	49	38	30	21	15	11	8.5	6.8	4.5
4	.....	.....	.....	122	83	60	46	36	29	19	14	10	8.1	6.4	4.3
4-1/4	.....	.....	.....	.....	79	57	43	34	27	18	13	10	7.7	6.1	4.1
4-1/2	.....	.....	.....	.....	75	54	41	32	26	18	13	9.5	7.4	5.9	3.9
4-3/4	.....	.....	.....	.....	71	52	39	31	25	17					
5	.....	.....	.....	.....	68	49	37	29	23	16					
5-1/4	.....	.....	.....	.....	.....	47	36	28	22	15					
5-1/2	.....	.....	.....	.....	.....	.....	34	27	22	15					



ALCOA

STANDARD MODIFIED BRAZIER HEAD RIVETS

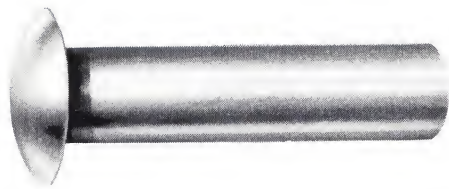


DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C
Fraction	Decimal		
1/16	.062	.116	.025
3/32	.094	.156	.031
1/8	.125	.235	.047
5/32	.156	.312	.063
3/16	.187	.390	.078
1/4	.250	.468	.094
5/16	.312	.625	.125
3/8	.375	.781	.156

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of Army, Navy Aeronautical specification AN456 insofar as applicable.





ALCOA

STANDARD MODIFIED BRAZIER HEAD RIVETS

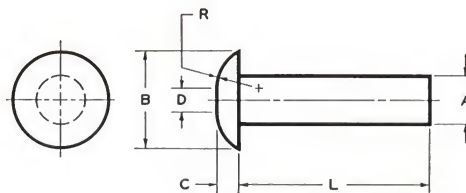
APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter - Inches							
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	1/4 0.250	5/16 0.312	3/8 0.375
3/32	23,256							
1/8	19,231							
3/16	14,085	6188	2932					
1/4	11,111	4876	2392	1362	840			
5/16	9174	4023	2016	1168	735			
3/8	7813	3423	1745	1025	649	369		
7/16	6803	2980	1536	909	584	331		
1/2	6024	2638	1373	819	531	300	169	
9/16	5405	2366	1240	746	485	274	156	
5/8	4902	2145	1132	684	448	253	145	91
11/16	4484	1962	1040	632	414	234	136	86
3/4	4132	1808	961	588	387	218	128	81
7/8	3571	1562	840	515	341	192	113	72
1	3135	1375	740	458	305	172	103	66
1-1/8	2801	1228	666	413	276	155	93	60
1-1/4	2532	1110	602	375	251	141	85	55
1-3/8	....	1012	549	344	232	130	79	51
1-1/2	....	930	507	317	214	120	73	48
1-3/4	....	801	440	275	186	105	64	42
2	....	703	387	243	165	92	57	38
2-1/2	312	197	134	75	46	31
3	262	165	113	63	39	26
3-1/2	142	98	55	34	23
4	125	86	48	30	20



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STANDARD UNIVERSAL HEAD RIVETS

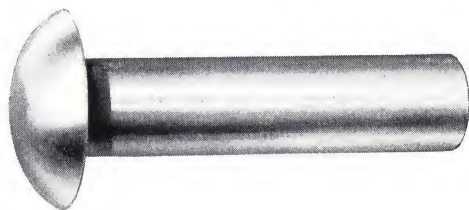


DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C	D	R
Fraction	Decimal				
1/16	.062	.125	.032	.031	.054
3/32	.094	.187	.045	.046	.082
1/8	.125	.250	.059	.062	.108
5/32	.156	.312	.072	.078	.135
3/16	.187	.375	.085	.093	.164
1/4	.250	.500	.112	.125	.217
5/16	.312	.625	.138	.156	.272
3/8	.375	.750	.166	.187	.328

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of Army-Navy Aeronautical Specification AN470 insofar as applicable.





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STANDARD UNIVERSAL HEAD RIVETS

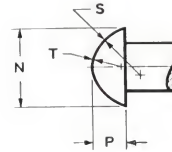
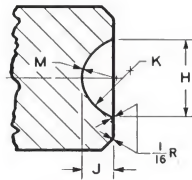
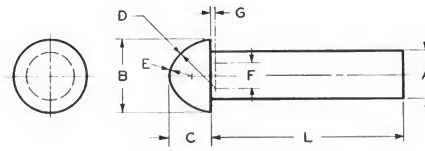
APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter							
	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
1/16	24,390	8547	3968					
3/32	19,608	7194	3436	1908	1261			
1/8	16,667	6250	3040	1712	1136	493		
3/16	12,658	4926	2457	1418	952	427	238	166
1/4	10,204	4049	2066	1212	813	377	214	149
5/16	8547	3436	1783	1057	714	338	193	135
3/8	7353	2994	1565	935	633	306	177	123
7/16	6452	2646	1397	840	571	279	163	114
1/2	5747	2375	1261	763	521	257	151	105
9/16	5181	2151	1148	699	476	238	141	98
5/8	4717	1969	1055	645	441	222	132	92
11/16	4329	1811	971	599	408	207	124	86
3/4	4000	1681	909	559	382	195	117	81
7/8	3472	1466	794	493	337	174	105	73
1	3067	1300	709	441	301	157	95	66
1-1/8	2488	1168	637	398	273	143	87	61
1-1/4	2092	1059	581	364	249	132	81	56
1-3/8	.....	971	535	334	229	122	75	52
1-1/2	.....	893	493	310	212	113	69	49
1-3/4	.....	775	427	270	185	99	61	43
2	.....	680	377	238	163	88	55	38
2-1/4	.....	.....	338	214	147	80	50	34
2-1/2	.....	.....	306	194	133	73	45	31
2-3/4	.....	.....	279	177	122	67	41	29
3	.....	.....	257	163	112	62	38	27
3-1/4	.....	.....	.....	151	104	57	36	25
3-1/2	.....	.....	.....	141	97	53	33	23
3-3/4	.....	.....	.....	132	91	50	31	22
4	.....	.....	.....	124	85	47	30	21
4-1/4	.....	.....	.....	.....	81	45	28	20
4-1/2	.....	.....	.....	.....	76	42	27	19
4-3/4	.....	.....	.....	.....	72	40	25	18
5	.....	.....	.....	.....	69	38	24	17
5-1/4	.....	.....	.....	.....	.....	36	23	16
5-1/2	.....	.....	.....	.....	.....	35	22	15



ALCOA

STANDARD HIGH BUTTON (ACORN) HEAD RIVETS



Hold-On (Dolly Bar), Also
Rivet Set Impression

Manufactured Head After
Driving, Also Driven Head

MANUFACTURED SHAPE

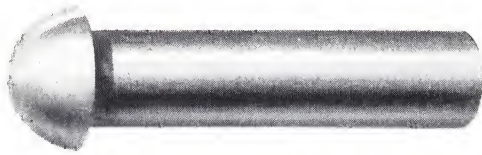
DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C	D	E	F	G
Fraction	Decimal						
1/2	.500	.781	.500	.656	.094	.517	.093
5/8	.625	.969	.594	.750	.188	.519	.093
3/4	.750	1.156	.688	.844	.281	.522	.093
7/8	.875	1.344	.781	.937	.375	.521	.093
1	1.000	1.531	.875	1.031	.469	.523	.093

DIMENSIONS IN INCHES

Nominal Diameter		H	J	K	M	N	P	S	T
Fraction	Decimal								
1/2	.500	.859	.359	.563	.375	.875	.375	.563	.375
5/8	.625	1.047	.422	.672	.453	1.063	.453	.672	.453
3/4	.750	1.234	.500	.797	.531	1.250	.531	.797	.531
7/8	.875	1.422	.578	.922	.609	1.438	.609	.922	.609
1	1.000	1.609	.656	1.031	.688	1.625	.688	1.031	.688

1. Refer to general information pages 213 to 216, for finish, tolerances and tempers.
2. Alloy identification marks are not incorporated on the head for this rivet but alloy numbers will be stamped on the end of the shank.
3. Sizes other than shown may be available on special order.
4. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of Navy Department Specification 43R5g type B-2 insofar as applicable.



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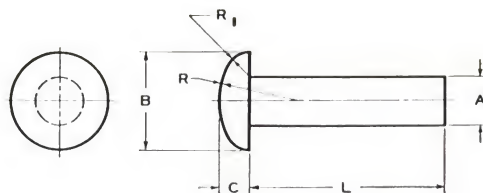
STANDARD HIGH BUTTON (ACORN) HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches				
	1/2—0.500	5/8—0.625	3/4—0.750	7/8—0.875	1—1.000
1/2	43				
9/16	41				
5/8	39	22			
11/16	37	21			
3/4	35	20	13		
13/16	34	20	13		
7/8	33	19	12	8.3	
15/16	31	18	12	8.1	
1	30	18	11	7.8	5.6
1-1/8	28	17	11	7.4	5.3
1-1/4	26	16	10	7.0	5.0
1-3/8	25	15	9.5	6.6	4.8
1-1/2	23	14	9.1	6.3	4.6
1-5/8	22	13	8.6	6.0	4.4
1-3/4	21	13	8.3	5.8	4.2
1-7/8	20	12	7.9	5.5	4.0
2	19	11	7.6	5.3	3.9
2-1/4	17	11	7.0	4.9	3.6
2-1/2	16	9.7	6.5	4.6	3.4
2-3/4	15	9.0	6.0	4.3	3.2
3	14	8.5	5.6	4.0	3.0
3-1/4	13	7.9	5.3	3.8	2.8
3-1/2	12	7.5	5.0	3.6	2.7
3-3/4	11	7.0	4.8	3.4	2.5
4	11	6.7	4.5	3.2	2.4
4-1/4	10	6.4	4.3	3.1	2.3
4-1/2	9.8	6.1	4.1	2.9	2.2

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STANDARD MUSHROOM HEAD RIVETS



Approximate Proportions:

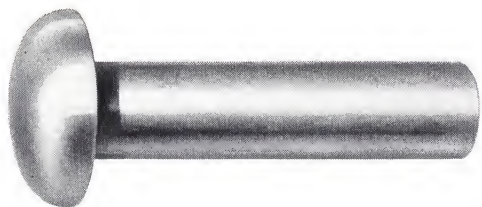
A = Nominal Diameter; B = 2A; C = .625A; R = 1.634A; R₁ = .5A

DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C	R	R ₁
Fraction	Decimal				
1/16	.053	.106	.033	.087	.026
	.062	.125	.039	.102	.031
	.072	.144	.045	.118	.036
5/64	.078	.156	.049	.128	.039
	.084	.168	.052	.137	.042
3/32	.094	.187	.059	.153	.047
	.103	.206	.064	.168	.051
7/64	.109	.219	.068	.179	.055
	.113	.226	.071	.185	.056
	.120	.240	.075	.196	.060
1/8	.125	.250	.078	.204	.062
	.134	.268	.084	.219	.067
9/64	.141	.281	.088	.230	.070
	.148	.296	.092	.242	.074
5/32	.156	.312	.098	.255	.078
	.165	.330	.103	.270	.082
11/64	.172	.344	.107	.281	.086
	.180	.360	.112	.294	.090
3/16	.187	.375	.117	.306	.094
	.193	.386	.121	.315	.096
13/64	.203	.406	.127	.332	.102
7/32	.219	.437	.137	.357	.109
15/64	.234	.469	.146	.383	.117
1/4	.250	.500	.156	.408	.125
9/32	.281	.562	.176	.460	.141
5/16	.312	.625	.195	.511	.156
3/8	.375	.750	.234	.613	.187
7/16	.437	.875	.273	.715	.219
1/2	.500	1.000	.312	.817	.250
9/16	.562	1.125	.352	.919	.281
5/8	.625	1.250	.391	1.021	.312
3/4	.750	1.500	.469	1.225	.375

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and temps.
2. Sizes other than shown may be available on special order.





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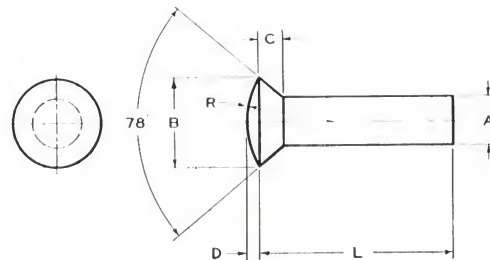
STANDARD MUSHROOM HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	19,685	6536	2985												
3/32	16,528	5714	2674	1466	877										
1/8	14,265	5076	2421	1346	813	538	373								
3/16	11,173	4167	2041	1157	714	476	334	244	182	111					
1/4	9174	3521	1764	1016	636	429	303	222	168	103	67.1	46.5			
5/16	7812	3058	1550	905	571	389	277	204	155	96.2	63.3	44.1	31.9	23.9	
3/8	6802	2695	1385	813	521	356	255	189	144	90.1	59.5	41.8	30.4	22.8	13.8
7/16	5988	2415	1252	741	476	329	236	176	135	84.7	56.5	39.7	29.1	21.8	13.3
1/2	5376	2183	1140	680	441	305	221	165	127	80.0	53.5	37.9	27.8	21.0	12.8
9/16	4878	1996	1048	629	410	284	206	155	119	75.8	51.0	36.2	26.7	20.2	12.4
5/8	4444	1835	971	585	382	266	194	146	113	71.9	48.5	34.6	25.6	19.4	12.0
11/16	4098	1701	901	546	358	251	183	138	107	68.5	46.5	33.2	24.6	18.7	11.6
3/4	3802	1582	840	513	338	236	173	131	102	65.4	44.4	31.9	23.7	18.1	11.2
7/8	3311	1391	746	457	302	213	156	119	92.6	59.9	41.0	29.6	22.0	16.9	10.6
1	2933	1241	667	412	273	193	143	109	84.7	55.2	38.0	27.5	20.6	15.8	10.0
1-1/8	2635	1120	606	373	249	177	131	100	78.7	51.3	35.6	25.8	19.4	14.9	9.4
1-1/4	2391	1020	556	342	229	163	121	92.6	73.0	47.8	33.3	24.2	18.2	14.1	9.0
1-3/8	.....	937	510	316	212	152	113	87.0	68.0	44.8	31.3	22.9	17.3	13.4	8.5
1-1/2	.....	867	474	294	198	141	105	81.3	64.1	42.2	29.6	21.6	16.4	12.7	8.2
1-3/4	.....	753	413	258	174	125	93.5	71.9	56.8	37.7	26.6	19.5	14.9	11.6	7.5
2	.....	666	366	229	155	111	83.3	64.5	51.3	34.2	24.2	17.8	13.6	10.6	6.9
2-1/4	.....	.....	329	206	140	101	75.8	58.8	46.7	31.2	22.1	16.4	12.5	9.8	6.4
2-1/2	.....	.....	298	187	128	92.6	69.4	53.8	42.7	28.7	20.4	15.2	11.6	9.1	6.0
2-3/4	.....	.....	273	172	117	84.7	64.1	49.5	39.5	26.6	18.9	14.1	10.8	8.5	5.6
3	.....	.....	252	159	108	78.1	59.2	46.1	36.8	24.8	17.7	13.2	10.1	8.0	5.3
3-1/4	.....	.....	.....	147	101	73.0	54.9	42.9	34.2	23.1	16.6	12.4	9.5	7.5	5.0
3-1/2	.....	.....	.....	138	94.3	68.0	51.5	40.2	32.2	21.8	15.6	11.7	9.0	7.1	4.7
3-3/4	.....	.....	.....	129	88.5	64.1	48.5	37.9	30.3	20.5	14.7	11.0	8.5	6.7	4.5
4	.....	.....	.....	121	83.3	60.6	45.7	35.7	28.6	19.4	13.9	10.4	8.1	6.4	4.3
4-1/4	.....	.....	.....	.....	78.7	57.1	43.3	33.8	27.1	18.4	13.2	9.9	7.7	6.1	4.1
4-1/2	.....	.....	.....	.....	74.6	54.3	41.2	32.1	25.8	17.5	12.6	9.5	7.3	5.8	3.9
4-3/4	.....	.....	.....	.....	70.9	51.5	39.1	30.6	24.5	16.7					
5	.....	.....	.....	.....	67.6	49.3	37.3	29.2	23.4	15.9					
5-1/4	.....	.....	.....	.....	.....	46.9	35.6	27.9	22.4	15.3					
5-1/2	.....	.....	.....	.....	.....	.....	34.1	27.4	21.5	14.7					

ALCOA

STANDARD 78° OVAL COUNTERSUNK HEAD RIVETS



Approximate Proportions:

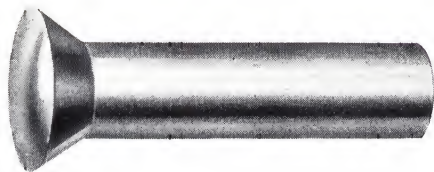
A = Nominal Diameter; B = 1.81A; C = .5A; D = .25A; R = 1.7656A

DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C	D	R
Fraction	Decimal				
1/16	.053	.096	.026	.013	.094
	.062	.112	.031	.016	.110
	.072	.130	.036	.018	.127
5/64	.078	.141	.039	.020	.138
	.084	.152	.042	.021	.148
3/32	.094	.170	.047	.023	.166
	.103	.186	.051	.026	.182
7/64	.109	.198	.055	.027	.193
	.113	.205	.056	.028	.200
	.120	.217	.060	.030	.212
1/8	.125	.225	.062	.031	.221
	.134	.243	.067	.033	.237
9/64	.141	.255	.070	.035	.248
	.148	.268	.074	.037	.261
5/32	.156	.282	.078	.039	.276
	.165	.299	.082	.041	.291
11/64	.172	.311	.086	.043	.303
	.180	.326	.090	.045	.318
3/16	.187	.339	.094	.047	.331
	.193	.349	.096	.048	.341
13/64	.203	.368	.101	.051	.358
7/32	.219	.396	.109	.055	.386
15/64	.234	.424	.117	.059	.414
1/4	.250	.452	.125	.062	.441
9/32	.281	.509	.141	.070	.497
5/16	.312	.565	.156	.078	.552
3/8	.375	.678	.187	.094	.662
7/16	.437	.792	.219	.109	.772
1/2	.500	.905	.250	.125	.883
9/16	.562	1.018	.281	.141	.993
5/8	.625	1.131	.312	.156	1.103
3/4	.750	1.357	.375	.187	1.324

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Sizes other than shown may be available on special order.
3. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of the Navy Department Specification 43R5g type 8, insofar as applicable.





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STANDARD 78° OVAL COUNTERSUNK HEAD RIVETS

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches														
	1/16 0.062	3/32 0.094	1/8 0.125	5/32 0.156	3/16 0.187	7/32 0.219	1/4 0.250	9/32 0.281	5/16 0.312	3/8 0.375	7/16 0.437	1/2 0.500	9/16 0.562	5/8 0.625	3/4 0.750
1/16	27,027	9524	4505												
3/32	21,459	7874	3831	2165	1328										
1/8	17,762	6757	3344	1912	1190	800	562								
3/16	13,218	5208	2660	1553	990	671	481	356	270	167					
1/4	10,526	4237	2203	1309	840	581	418	312	239	149	100	70.4			
5/16	8772	3584	1887	1130	736	510	370	278	214	136	90.9	64.9	47.6	36.1	
3/8	7463	3100	1642	990	649	455	332	251	194	124	84.0	59.2	44.4	33.7	20.9
7/16	6536	2732	1458	885	585	410	301	228	177	114	77.8	55.9	41.5	31.6	19.7
1/2	5814	2445	1311	801	532	375	275	210	163	106	72.5	52.2	38.9	29.9	18.7
9/16	5208	2208	1189	730	485	344	254	193	151	98.0	67.8	49.0	36.8	28.2	17.8
5/8	4739	2012	1089	671	448	317	235	180	141	91.7	63.7	46.3	34.7	26.7	16.9
11/16	4348	1852	1005	621	415	296	219	168	132	86.2	60.2	43.7	32.9	25.4	16.2
3/4	4005	1712	934	578	388	276	205	158	124	81.3	56.8	41.5	31.3	24.2	15.5
7/8	3472	1493	813	508	341	244	182	140	111	73.2	51.3	37.6	28.5	22.2	14.2
1	3058	1319	725	450	305	219	164	126	100	66.7	46.7	34.4	26.2	20.4	13.2
1-1/8	2736	1183	649	407	276	198	149	115	90.9	61.0	42.9	31.7	24.2	18.9	12.3
1-1/4	2474	1073	592	370	252	181	136	106	84.0	56.2	39.7	29.4	22.5	17.6	11.5
1-3/8	.....	981	541	340	231	167	126	97.1	77.5	52.1	36.9	27.4	21.0	16.5	10.8
1-1/2	.....	904	500	314	214	155	117	90.9	71.9	48.5	34.5	25.7	19.7	15.5	10.2
1-3/4	.....	781	433	273	187	135	102	79.4	63.3	42.7	30.5	22.8	17.5	13.9	9.2
2	.....	688	382	241	165	120	90.1	70.4	56.5	38.2	27.4	20.5	15.8	12.5	8.3
2-1/4	.....	.....	341	216	148	107	81.3	63.7	50.8	34.5	24.8	18.6	14.4	11.4	7.6
2-1/2	.....	.....	309	195	134	98.0	74.1	57.8	46.3	31.5	22.7	17.0	13.2	10.5	7.0
2-3/4	.....	.....	.....	179	123	89.3	67.6	52.9	42.6	29.0	20.9	15.7	12.2	9.7	6.5
3	.....	.....	.....	164	113	82.3	62.5	49.0	39.2	26.8	19.3	14.5	11.3	9.0	6.1
3-1/4	.....	.....	.....	152	105	76.3	58.1	45.5	36.5	24.9	18.0	13.6	10.6	8.4	5.7
3-1/2	.....	.....	.....	142	98.0	71.4	54.1	42.4	34.1	23.3	16.9	12.7	9.9	7.9	5.3
3-3/4	.....	.....	.....	133	91.7	66.7	50.8	39.8	31.9	21.9	15.8	12.0	9.3	7.5	5.1
4	.....	.....	.....	125	86.2	62.9	47.8	37.5	30.1	20.6	15.0	11.3	8.8	7.0	4.8
4-1/4	.....	.....	.....	.....	81.3	59.2	45.0	35.5	28.5	19.5	14.2	10.7	8.4	6.7	4.5
4-1/2	.....	.....	.....	.....	76.9	56.2	42.7	33.6	27.0	18.5	13.4	10.2	7.9	6.4	4.3
4-3/4	.....	.....	.....	.....	73.0	53.2	40.7	31.8	25.6	17.6					
5	69.4	50.8	38.6	30.4	24.4	16.8					
5-1/4	48.3	36.9	29.0	23.3	16.0					
5-1/2	35.3	27.7	22.3	15.3					

Misc.
Fasteners,
Accessories

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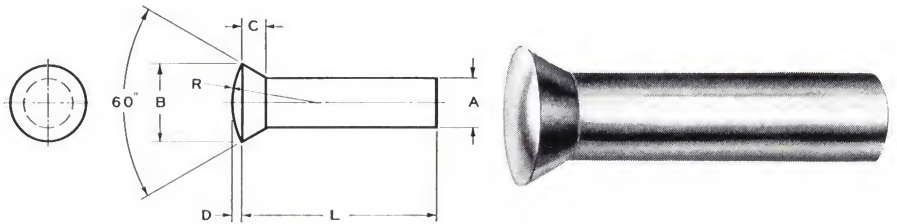
Design
Information
Tables

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ALCOA

STANDARD 60° OVAL COUNTERSUNK HEAD RIVETS



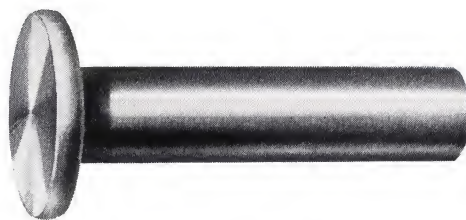
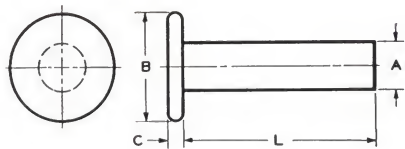
DIMENSIONS IN INCHES

Nominal Diameter (A)		B	C	D	R
Fraction	Decimal				
1/2	.500	.788	.250	.093	.881
5/8	.625	.985	.312	.117	1.095
3/4	.750	1.183	.375	.140	1.319
7/8	.875	1.380	.437	.164	1.534
1	1.000	1.577	.500	.187	1.755

APPROXIMATE PIECES PER POUND

Length L Inches	Nominal Diameter—Inches				
	1/2—0.500	5/8—0.625	3/4—0.750	7/8—0.875	1—1.000
1/2	64				
9/16	59				
5/8	55	33			
11/16	52	31			
3/4	49	29	19		
13/16	46	28	18		
7/8	43	26	17	12	
15/16	41	25	16	11	
1	39	24	16	11	8.0
1-1/8	36	22	14	10	7.4
1-1/4	33	20	13	9.4	6.9
1-3/8	30	19	12	8.8	6.5
1-1/2	28	17	12	8.2	6.1
1-5/8	26	16	11	7.8	5.7
1-3/4	25	15	10	7.3	5.4
1-7/8	23	14	10	6.9	5.2
2	22	14	9.3	6.6	4.9
2-1/4	20	12	8.3	6.0	4.5
2-1/2	18	11	7.6	5.5	4.1
2-3/4	17	10	7.0	5.1	3.7
3	15	10	6.5	4.7	3.5
3-1/4	14	8.9	6.1	4.4	3.3
3-1/2	13	8.4	5.7	4.1	3.1
3-3/4	13	7.9	5.4	3.9	2.9
4	12	7.4	5.1	3.7	2.8
4-1/4	11	7.0	4.8	3.5	2.6
4-1/2	11	6.7	4.5	3.3	2.5

1. Refer to general information pages 213 to 216, for alloy identification marks, finish, tolerances and tempers.
2. Where so specified on customer's order, these rivets will be fabricated to fulfill the requirements of Navy Department Specification 43R5g type C-2.



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STANDARD TINNER'S RIVETS

Approximate Proportions: $A = \text{Body Diameter}$; $B = 2.25A$; $C = .3A$

DIMENSIONS IN INCHES

Size No.*	A	B	C	Length	Approximate Pieces Per Lb.
8 Oz.	.089	.207	.027	.160	5203
12 Oz.	.105	.236	.031	.190	3305
1 Lb.	.111	.249	.033	.200	2799
1-1/2 Lb.	.130	.292	.039	.230	1750
2 Lb.	.144	.324	.043	.270	1248
2-1/2 Lb.	.148	.333	.044	.280	1147
3 Lb.	.160	.360	.048	.310	891
4 Lb.	.176	.396	.052	.340	676
6 Lb.	.203	.456	.060	.390	442
8 Lb.	.224	.504	.067	.440	323
10 Lb.	.238	.535	.071	.470	269
12 Lb.	.259	.582	.077	.500	212
14 Lb.	.284	.639	.085	.520	165
16 Lb.	.300	.675	.090	.530	142

TOLERANCES DIMENSIONS IN INCHES

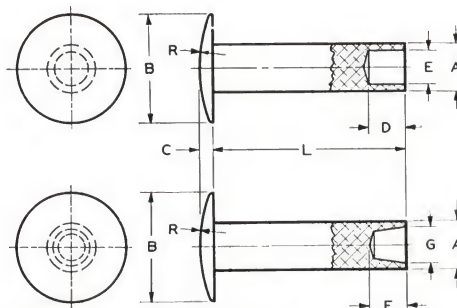
Size (Inclusive)	Body Diameter	
	Plus	Minus
8 Oz. — 2-1/2 Lb.	.002	.004
3 Lb. — 10 Lb.	.003	.006
12 Lb. — 16 Lb.	.004	.008

1. Refer to general information pages 213 to 216 for alloy identification marks, finish, and tempers.
2. (*) Size numbers refer to the "trade name" or weight of 1000 STEEL rivets.
3. Sizes other than shown may be available on special order.
4. The above rivet dimensions conform to American Standard Specification B18g-1929 insofar as applicable.



ALCOA

STANDARD SEMI-TUBULAR OVAL HEAD RIVETS

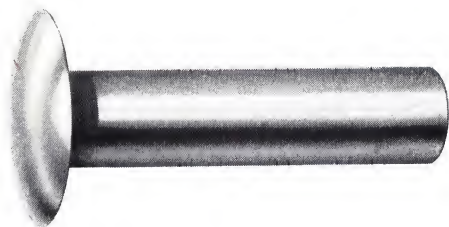


DIMENSIONS IN INCHES

Body Diameter (A)		B	C	R	Straight Hole			Tapered Hole		
Fraction	Decimal				D	E	Part No.	F	G	Part No.
1/16	.059	.105	.015	.123	.046	.040	R-1481	.046	.046	R-1499
		.125	.020	.123	.046	.040	R-1482	.046	.046	R-1500
3/32	.088	.148	.024	.153	.062	.064	R-1483*	.094	.069	R-1501
3/32	.094	.148	.024	.153	.062	.064	R-1777	.094	.069	R-1787
3/32+	.098	.188	.035	.164	.078	.074	R-1484	.094	.076	R-1502
1/8	.121	.219	.030	.267	.094	.086	R-1477-1	.094	.094	R-1503
		.219	.030	.267	.062	.086	R-1477-2*			
		.281	.033	.392	.094	.086	R-1485	.094	.094	R-1504
1/8	.125	.219	.030	.267	.094	.086	R-1778	.094	.094	R-1788
		.281	.033	.392	.094	.086	R-1779	.094	.094	R-1789
9/64	.141	.234	.034	.261	.125	.098	R-1780	.125	.114	R-1790
		.313	.041	.372	.125	.098	R-1781	.125	.114	R-1791
		.375	.050	.424	.125	.098	R-1782	.125	.114	R-1792
9/64+	.146	.234	.034	.261	.125	.098	R-1473	.125	.114	R-1505
		.281	.047	.375	.125	.098	R-1783	.125	.114	R-1578
		.313	.041	.372	.125	.098	R-1486	.125	.114	R-1506
		.375	.050	.424	.125	.098	R-1487	.125	.114	R-1507
5/32	.156	.281	.047	.375	.125	.098	R-1784	.125	.114	R-1793
		.313	.041	.372	.125	.098	R-1785	.125	.114	R-1794
		.375	.050	.424	.125	.098	R-1786	.125	.114	R-1795
3/16	.187	.313	.065	.233	.187	.135	R-1488-1	.125	.146	R-1508
		.313	.065	.233	.125	.135	R-1488-2*			
		.375	.077	.279	.187	.135	R-1489	.125	.146	R-1509

1. Refer to general information pages 213 to 216, for finish, tolerances and tempers.
2. Tubular rivets are supplied without alloy identification marks unless otherwise specified.
3. Sizes other than shown may be available on special order.
4. Items marked "★" conform to Army-Navy Aeronautical Specification AN450 revised 8/23/45, insofar as applicable.





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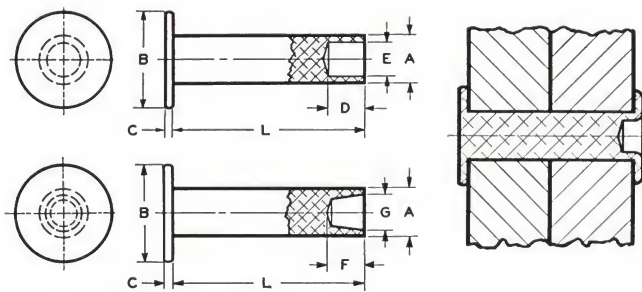
STANDARD SEMI-TUBULAR OVAL HEAD RIVETS

WEIGHT PER 1,000 PIECES (Approximate Lbs.)

Body Dia.	Part No.		Length—Inches											
			1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
.059	R1481	& R1499	.018	.035	.053	.070	.087	.10						
.059	R1482	& R1500	.024	.041	.059	.076	.093	.11						
.088	R1483	& R1501	...	.078	.12	.16	.19	.23	.27	.31	.35	.39		
.094	R1777	& R1787	...	.089	.13	.18	.22	.26	.31	.35	.40	.44		
.098	R1484	& R1502	...	.11	.16	.21	.26	.30	.35	.40	.45	.49		
.121	R1477-1	& R1503	...	.15	.22	.29	.37	.44	.51	.58	.66	.73	.80	.87
.121	R1477-2		...	.17	.24	.31	.39	.46	.53	.60	.68	.75	.82	.89
.121	R1485	& R1504	...	.20	.27	.34	.41	.49	.56	.63	.70	.78	.85	.92
.125	R1778	& R1788	...	.16	.24	.31	.39	.47	.55	.62	.70	.78	.86	.93
.125	R1779	& R1789	...	.21	.28	.36	.44	.51	.59	.67	.75	.82	.90	.98
.141	R1780	& R1790	...	...	.28	.38	.47	.57	.67	.77	.87	.97	1.1	1.2
.141	R1781	& R1791	...	...	.36	.46	.56	.66	.76	.86	.95	1.1	1.2	1.2
.141	R1782	& R1792	...	...	.49	.58	.68	.78	.88	.98	1.1	1.2	1.3	1.4
.146	R1473	& R1505	...	...	.30	.40	.51	.61	.72	.83	.93	1.0	1.1	1.2
.146	R1783	& R1578	...	...	.37	.48	.59	.69	.80	.90	1.0	1.1	1.2	1.3
.146	R1486	& R1506	...	...	.38	.49	.60	.70	.81	.91	1.0	1.1	1.2	1.3
.146	R1487	& R1507	...	...	.51	.61	.72	.82	.93	1.0	1.1	1.2	1.4	1.5
.156	R1784	& R1793	...	...	.42	.54	.66	.78	.90	1.0	1.1	1.3	1.4	1.5
.156	R1785	& R1794	...	...	.43	.55	.67	.79	.91	1.0	1.2	1.3	1.4	1.5
.156	R1786	& R1795	...	...	.55	.67	.79	.91	1.0	1.2	1.3	1.4	1.5	1.6
.187	R1488-1	& R1508	...	...	.52	.69	.86	1.0	1.2	1.4	1.6	1.7	1.9	2.1
.187	R1488-2	61	.78	.95	1.1	1.3	1.5	1.6	1.8	2.0	2.2
.187	R1489	& R150970	.88	1.1	1.2	1.4	1.6	1.7	1.9	2.1	2.3

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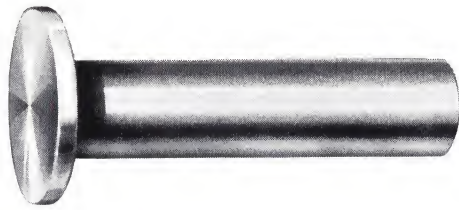
STANDARD SEMI-TUBULAR FLAT HEAD RIVETS



DIMENSIONS IN INCHES

Body Diameter (A)		B	C	Straight Hole			Tapered Hole		
Fraction	Decimal			D	E	Part No.	F	G	Part No.
1/8	.121	.250	.020	.094	.086	R-1711-1	.094	.094	R-1843
		.250	.020	.062	.086	R-1711-2			
1/8	.125	.250	.020	.094	.086	R-1840	.094	.094	R-1844
9/64	.141	.312	.047	.125	.098	R-1841	.125	.114	R-1845
9/64+	.146	.312	.047	.125	.098	R-1712	.125	.114	R-1846
5/32	.156	.312	.047	.125	.098	R-1842	.125	.114	R-1847
3/16	.187	.437	.062	.187	.135	R-1713-1	.125	.146	R-1848
		.437	.062	.125	.135	R-1713-2			

1. Refer to general information pages 213 to 216, for finish, tolerances and tempers.
2. Tubular rivets are supplied without alloy identification marks unless otherwise specified.
3. Sizes other than shown may be available on special order.



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STANDARD SEMI-TUBULAR FLAT HEAD RIVETS

WEIGHT PER 1,000 PIECES (Approximate Lbs.)

Body Diameter	Part No.	Length—Inches										
		1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
.121	R1711-1 & R1843	.189	.261	.334	.406	.479	.551	.624	.696	.769	.841	.914
.121	R1711-2	.208	.280	.353	.425	.498	.570	.643	.715	.788	.860	.933
.125	R1840 & R1844	.199	.276	.353	.431	.508	.586	.663	.740	.818	.895	.972
.141	R1841 & R1845	...	.563	.661	.759	.858	.956	1.06	1.15	1.25	1.35	1.45
.146	R1712 & R1846	...	.584	.690	.795	.901	1.01	1.11	1.22	1.32	1.43	1.53
.156	R1842 & R1847	...	.628	.749	.869	.990	1.11	1.23	1.35	1.47	1.59	1.71
.187	R1713-1 & R1848	...	1.19	1.36	1.53	1.71	1.88	2.05	2.23	2.40	2.57	2.75
.187	R1713-2	...	1.28	1.45	1.62	1.80	1.97	2.14	2.32	2.49	2.66	2.84

Misc.
Fasteners,
Accessories

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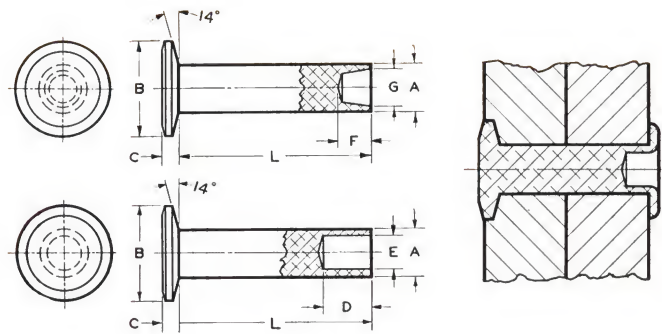
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STANDARD SEMI-TUBULAR FLAT COUNTERSUNK HEAD RIVETS

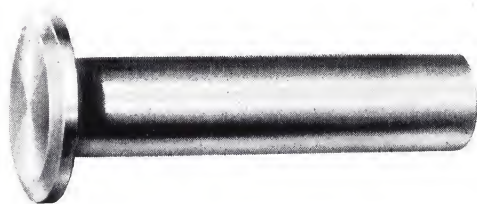
(BRAKE BAND TYPE)



DIMENSIONS IN INCHES

Body Diameter (A)		B	C	Straight Hole			Tapered Hole		
Fraction	Decimal			D	E	Part No.	F	G	Part No.
9/64+	.146	.312	.046	.125	.098	R-1493	.125	.114	R-1510
		.375	.046	.125	.098	R-1494	.125	.114	R-1511
		.437	.046	.125	.098	R-1495	.125	.114	R-1512
3/16	.187	.375	.062	.187	.135	R-1496	.125	.146	R-1513
		.437	.062	.187	.135	R-1497	.125	.146	R-1514
		.500	.062	.187	.135	R-1498	.125	.146	R-1515

1. Refer to general information pages 213 to 216, for finish, tolerances and temps.
2. Tubular rivets are supplied without alloy identification marks unless otherwise specified.
3. Sizes other than shown may be available on special order.



ALCOA
STANDARD
SEMI-TUBULAR
FLAT COUNTERSUNK
HEAD RIVETS
(BRAKE BAND TYPE)

WEIGHT PER 1,000 PIECES (Approximate Lbs.)

Body Diameter	Part No.	Length—Inches									
		3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
.146	R1493 & R1510	.469	.574	.679	.784	.888	.993	1.10	1.20	1.31	1.41
.146	R1494 & R1511	.525	.630	.735	.840	.944	1.05	1.15	1.26	1.36	1.47
.146	R1495 & R1512	.572	.677	.782	.887	.991	1.10	1.20	1.31	1.41	1.51
.187	R1496 & R1513	.777	.948	1.12	1.29	1.46	1.64	1.81	1.98	2.15	2.32
.187	R1497 & R1514	.899	1.07	1.24	1.42	1.59	1.76	1.93	2.10	2.27	2.45
.187	R1498 & R1515	1.00	1.17	1.34	1.52	1.69	1.86	2.03	2.20	2.37	2.55

Misc.
Fasteners,
Accessories

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ALCOA

STANDARD NAILS



Common
Nail



Escutcheon
Pin



Shingle
Nail
(Standard)



Roofing
Nail



Asbestos
Shingle
Nail



Plaster
Board
Nail
(Long Point)

DIMENSIONS IN INCHES

COMMON NAILS

Size	Length	Gage Body Diameter	Head Diameter	Approximate Pieces Per Lb.
2d	1	15 (.072)	11/64	2198
4d	1-1/2	12-1/2 (.098)	1/4	780
6d	2	11-1/2 (.114)	17/64	448
8d	2-1/2	10-1/4 (.131)	9/32	276
9d	2-3/4	10-1/4 (.131)	9/32	253
10d	3	9 (.148)	5/16	182
12d	3-1/4	9 (.148)	5/16	168
16d	3-1/2	8 (.162)	11/32	130
20d	4	6 (.192)	13/32	82
30d	4-1/2	5 (.207)	7/16	62
40d	5	4 (.225)	15/32	47

ESCUTCHEON PINS

No. 1	3/4	15 (.072)	1/8	3077
No. 2	3/4	13-3/4 (.083)	13/64	2150
No. 3	1	13-3/4 (.083)	13/64	1660
No. 4	1-1/4	10-1/4 (.130)	9/32	520
No. 5	1-1/2	10-1/4 (.130)	9/32	450
No. 6	1-3/4	8-1/2 (.153)	23/64	285
No. 7	2	8-1/2 (.153)	23/64	250

SHINGLE NAILS (STANDARD)

7/8	7/8	12-1/2 (.098)	9/32	1264
1	1	12-1/2 (.098)	9/32	1129
3d	1-1/4	12-1/2 (.098)	9/32	929

ROOFING NAILS

1	1	10 (.135)	7/16 Max.	557
1-1/4	1-1/4	10 (.135)	7/16 Max.	464
1-1/2	1-1/2	10 (.135)	7/16 Max.	397
1-3/4	1-3/4	10 (.135)	7/16 Max.	347
2	2	10 (.135)	7/16 Max.	309
2-1/2	2-1/2	9 (.148)	7/16 Max.	209

ASBESTOS SHINGLE NAILS

1-1/4	1-1/4	11-1/2 (.114)	5/16	683
1-1/2	1-1/2	11-1/2 (.114)	5/16	581
1-3/4	1-3/4	11-1/2 (.114)	5/16	505

PLASTER BOARD NAILS

1-1/4	1-1/4	12-1/2 (.098)	5/16	904
-------	-------	---------------	------	-----

1. Aluminum nails drive satisfactorily in soft wood and some hard woods. Their use in the more dense woods such as seasoned massive oak is not recommended.
2. Nails are regularly packed in bulk.
3. For styles and sizes not listed consult nearest Alcoa Sales office.
4. 3D, 5D and 7D, standard common nails will be manufactured on special orders, but their use in aluminum is not recommended. It is suggested that the next larger size nail be used for these 3 diameters.
5. All nails are furnished with etched (caustic dipped) finish unless otherwise specified. Escutcheon pins may be furnished in bright finish where so specified.

SECTION

10

MISCELLANEOUS FASTENERS AND ACCESSORIES

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MISCELLANEOUS FASTENERS AND ACCESSORIES

The miscellaneous items listed in this section represent products which have been in sufficient demand to warrant setting them up as standard Alcoa aluminum products. Their popularity results from the same properties which distinguish all Alcoa fasteners, namely clean, bright appearance, high strength, light weight, freedom from unsightly staining of adjacent surfaces, and a resistance to corrosion which assures years of trouble-free service.

BOOKBINDING FASTENERS

Alcoa bookbinding accessories have long been standard items for the assembling of certain types of binding work. They are burnished to a bright finish which gives a pleasing appearance and the threads are specially designed to permit easy assembly by hand.

Regular binding posts are produced in a variety of lengths and are used for the most part where the bound volume is of a predetermined thickness (equal to the length of the nut) which will be substantially unchanged although certain sheets may be added or removed. Regular binding screws are furnished in two lengths only, the 1/4" for use with the 1/4" nut, and the 3/8" for use with all other nuts.

Full expansion binding posts are tapped only part way through but a clearance hole is drilled for the balance of the length of the post to permit each post to engage a screw of equal length. These items are normally used where the thickness of the bound volume is expected to vary from time to time. A full expansion post and screw combination can successfully accommodate volumes varying in thickness from an amount equal to the length of the post to an amount equal to the combined length of the post and screw minus the minimum length of engagement required.

Binding post extensions are used with regular binding posts and, as the name implies, serve the purpose of converting a binding post to one of longer length when required to accommodate a volume of increased thickness.

Alcoa Aluminum bookbinding fasteners are sold through the following distributors who specialize in binding supplies:

SLADE, HIPPIE, AND MELOY, INC.

119 West Lake Street, Chicago, Illinois . . . Phone—RAndolph 2590

GRIFFIN, CAMPBELL, HAYES, WALSH, INC.

50 East 21st Street, New York 10, N. Y. . . . Phone—ALgonquin 4-7650

GANE BROTHERS AND LANE, INC.

1515-1519 Pine Street, St. Louis 3, Missouri . . . Phone—MAin 0432



ALCOA

BINDING POSTS

FULL

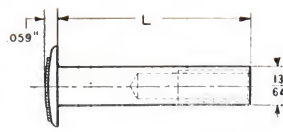
EXPANSION POSTS

SCREWS

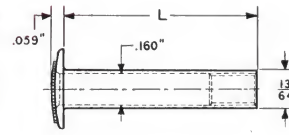
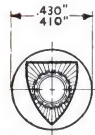
EXTENSIONS

Bright Finish

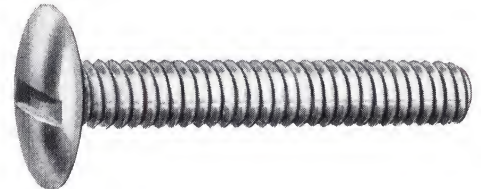
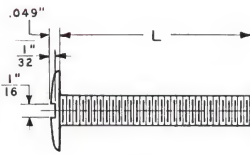
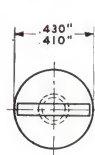
ALCOA 24S-T4 ALLOY



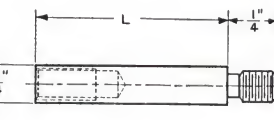
Binding Post



Full Expansion Post



Screw



Extension

All Threads .161-32 N. S. (See Notes for Thread Depths)

DIMENSIONS IN INCHES

Length L Inches	Binding Posts		Full Expansion Posts		Screws		Extensions	
	Weight Per 1000 Pieces, Approx. Lbs.	Package Quantity	Weight Per 1000 Pieces, Approx. Lbs.	Package Quantity	Weight Per 1000 Pieces, Approx. Lbs.	Package Quantity	Weight Per 1000 Pieces, Approx. Lbs.	Package Quantity
1/4	.85★	1000	.....	.....	.88★	Normally Packed in Cloth Bag with Posts in Same Quantities	.....	Normally Shipped in Bulk
3/8	1.05★	1000	.....	.....	1.08★		.....
1/2	1.25★	1000	1.25★	1000	1.21		1.29★	
5/8	1.64★	1000	1.33★	1000	1.40★		.....
3/4	2.04★	1000	1.32★	500	1.59★		2.03★	
7/8	2.43	1000						
1	2.83★	1000	1.62★	500	1.96★		2.77★	
1-1/4	3.62★	500	1.92★	500	2.34★			
1-1/2	4.41★	500	2.21	500	2.71			
1-3/4	5.21★	500						
2	6.00★	500						
2-1/4	6.79★	500						
2-1/2	7.55★	250						
3	9.17★	250						
3-1/2	10.8	250						
4	12.3	250						

1. 1/4" long binding posts use 1/4" long screws, all other binding posts use 3/8" long screws.

2. Full expansion posts use screws of same length as posts.

3. The 1/2" long binding post is used as a 1/2" long full expansion post.

4. LENGTH OF USABLE INTERNAL THREAD

BINDING POSTS: Posts 1/2" long and under are drilled and tapped full length. Posts over 1/2" long have 3/8" of usable thread.

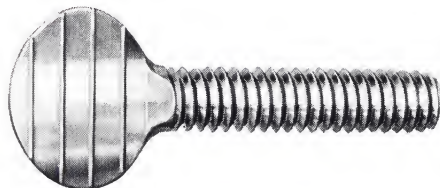
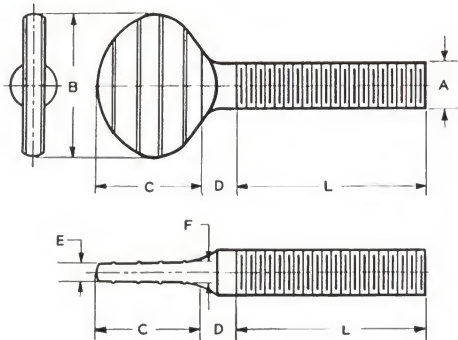
FULL EXPANSION POSTS: 1/2" and 5/8" long posts are drilled and tapped full length. All other lengths of posts have 1/4" of usable thread with a clearance hole the remainder of the length of the post.

EXTENSIONS: All lengths of extensions have 5/16" of usable thread.

5. Items marked "★" are normally carried in stock by Alcoa.

6. Binding posts, full expansion posts, or screws can be supplied separately on special order, either boxed or packed in bulk.

7. Will be furnished with Alcoa's Alumilite finish, if specified.



ALCOA

THUMB SCREWS

Bright Finish

ALCOA 17S-T4 ALLOY

DIMENSIONS IN INCHES

Nominal Size A	Width of Head B	Height of Head C	D	E	F
6-32	13/32	5/16	1/8	3/64	1/16
8-32	31/64	3/8	9/64	3/64	1/16
10-24	9/16	7/16	5/32	1/16	5/64
1/4-20	3/4	9/16	3/16	3/32	7/64
5/16-18	1	13/16	3/16	7/64	1/8
3/8-16	1-1/16	7/8	1/4	1/8	9/64

WEIGHT PER 100 PIECES (Approximate Lbs.)

Length L Inches	Thread Size					
	6-32	8-32	10-24	1/4-20	5/16-18	3/8-16
1/4	.091					
1/2	.119	.199	.278★	.603		
3/4	.146	.239	.330★	.697★	1.28	1.86
1	.173	.280	.382★	.790★	1.43★	2.08
1-1/4	.200	.320	.434★	.883★	1.59★	2.30
1-1/2	.227	.361	.486	.977★	1.74★	2.52
1-3/4	.254	.401	.537	1.07	1.89	2.74
2	....	....	.589	1.16	2.04★	2.97

1. All threads are Class 2 free fit.
2. Thumb screws may be made with American National Fine threads if ordered in sufficient quantity.
3. Packed in bulk. May be packed 100 pieces per box on special order.
4. Parts are normally threaded as close to the head as is practical. Shorter thread lengths are available on special order.
5. Will be furnished with Alcoa's Aluminite finish, if specified.
6. Items marked "★" are normally carried in stock by Alcoa.

Design
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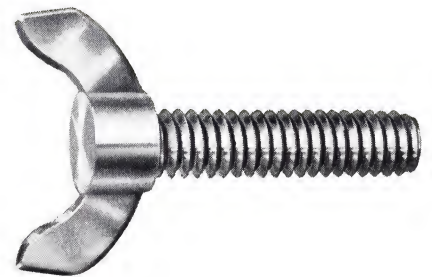
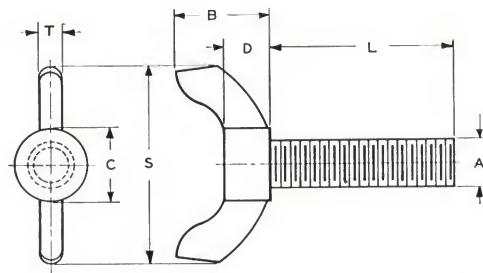
11



ALCOA

WING SCREWS

Bright Finish



ALCOA 245-T4 ALLOY

DIMENSIONS IN INCHES

Nominal Size A	Head Dimensions				
	Wing Spread S	Total Height B	Diameter of Base of Head C	Height of Base of Head D	Wing Thickness T
10—24	1	15/32	3/8	7/32	3/32
1/4—20	1-1/16	33/64	13/32	1/4	1/8
5/16—18	1-5/16	5/8	1/2	9/32	1/8
3/8—16	1-37/64	49/64	5/8	23/64	5/32

WEIGHT PER 100 PIECES (Approximate Lbs.)

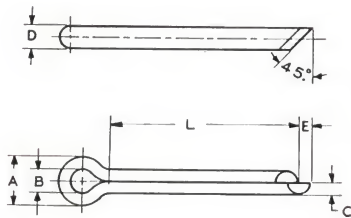
Length L Inches	Thread Size			
	10—24	1/4—20	5/16—18	3/8—16
1/2	.475	.736		
3/4	.528	.830	1.34	2.29
1	.580	.923	1.49	2.51
1-1/4	.633	1.02	1.64	2.73
1-1/2	.685	1.11	1.79	2.95
1-3/4	.738	1.20	1.94	3.17
2	.790	1.30	2.09	3.39

1. All threads are class 2 free fit.
2. Packed in bulk. May be packed 100 per box on special order.
3. Will be furnished with Alcoa's Alumilite finish, if specified.
4. Parts are normally threaded as close to the head as is practical. Shorter thread lengths are available on special order.
5. Wing screws may be made with American National Fine Threads if ordered in sufficient quantity.
6. Wing screws are not normally carried in stock by Alcoa.

ALCOA

COTTER
PINS

Dip Finish



DIMENSIONS IN INCHES

ALCOA 61S-O ALLOY

Nominal Diameter D	Wire Size		Loop Dimensions	
	Width D	Thickness C	Outside Diameter A	Inside Diameter B
1/16	1/16	1/32	1/8	1/16
3/32	3/32	3/64	3/16	3/32
1/8	1/8	1/16	1/4	1/8
5/32	5/32	5/64	5/16	5/32
3/16	3/16	3/32	3/8	3/16
1/4	1/4	1/8	1/2	1/4

WEIGHT PER 1000 PIECES (Approximate Lbs.)

Length L Inches	Diameters					
	1/16	3/32	1/8	5/32	3/16	1/4
1/2	.175★	.415	.798			
3/4	.240★	.566★	1.07	1.66	2.50	
1	.308★	.716★	1.35★	2.04★	3.11	5.44
1-1/4	.376★	.866★	1.63	2.43	3.73	6.44
1-1/2	.444	1.02★	1.90★	2.81★	4.35★	7.45★
1-3/4	.512	1.17	2.18★	3.20	4.96	8.45
2	.580	1.32	2.45★	3.58★	5.58★	9.45★
2-1/4	....	....	....	3.96	6.19	10.5
2-1/2	....	1.62	3.00	4.35	6.81★	11.5★
3	....	....	3.55	5.12	8.02	13.5
3-1/2	....	....	....	....	9.27	15.5
4	....	....	....	....	9.89	17.5
Package Quantity	1000		500	250		125

1. Tolerances on wire sizes:

Thickness: $\pm .002$ Width: $\pm .004$

2. Packed in bulk or boxed in quantities indicated above.

3. Items marked "★" are normally carried in stock by Alcoa.

4. Parts are carried in stock in the 61S-O condition, but may be heat treated to the 61S-T4 or 61S-T6 temper if required.

Design
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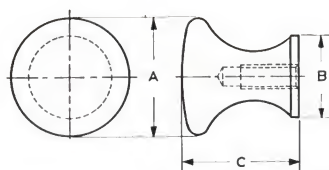
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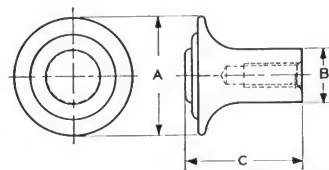
ALCOA

KNOBS

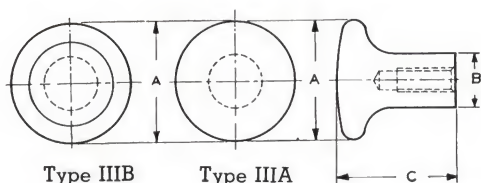
Bright Finish



Type I Alcoa 11S-T3 Alloy



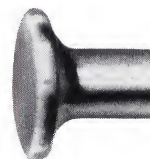
Type II Alcoa 53S-T6 Alloy



Type IIIB

Type IIIA

Alcoa 53S-T6 Alloy

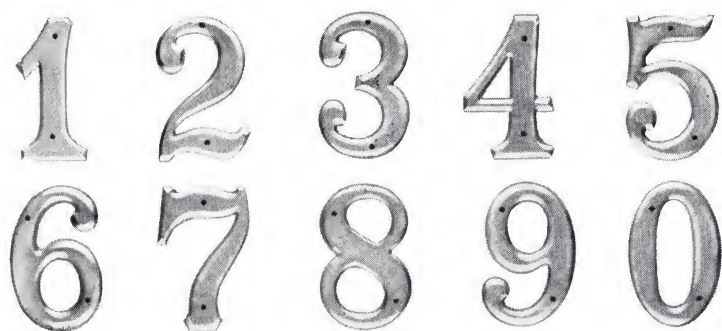


DIMENSIONS IN INCHES

Type Knob	Large Diameter A	Small Diameter B	Length C	Thread Size	Depth of Usable Thread	Weight Per Thousand, Approximate Lbs.
Type I	1/2	3/8	1/2	6-32	1/4	4.8
	3/4★	9/16	3/4	8-32	3/8	14.6
	1 ★	3/4	1	10-24	1/2	34.5
	1-1/4	7/8	1-1/4	1/4-20	5/8	64.2
Type II	1/2	5/16	1/2	6-32	1/4	4.5
	3/4★	3/8	11/16	8-32	3/8	10.5
	1 ★	7/16	7/8	10-24	1/2	19.2
	1-1/4	9/16	1-1/16	1/4-20	5/8	37.3
Type III A and III B	1/2	1/4	1/2	6-32	1/4	3.9
	3/4★	5/16	11/16	8-32	3/8	9.5
	1 ★	7/16	7/8	10-24	1/2	25.1
	1-1/4	9/16	1-1/16	1/4-20	5/8	49.5

1. Type III B knob is the same as Type III A except that the knob has been given a black or colored Alumilite coating and subsequently has a shallow groove machined in the head exposing the unaluminized metal to form a decorative ring.
2. All threads are Class II free fit.
3. May be furnished with Alcoa's Alumilite finish, if specified.
4. Items marked "★" are normally carried in stock by Alcoa.

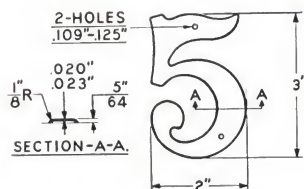




ALCOA SHEET NUMERALS

Bright Finish

ALCOA 3S-H14 ALLOY



DIMENSIONS IN INCHES

Numeral	Weight Per 100 Pieces Approximate Lbs.	Numeral	Weight Per 100 Pieces Approximate Lbs.
1★	.56	6★	.75
2★	.69	7★	.64
3★	.69	8★	.77
4★	.62	9★	.75
5★	.70	0★	.75

1. Numerals may be packed in bulk or wrapped in bundles of 25, 50 or 100 pieces of a kind.
2. Will be furnished with Alcoa's Alumilite finish, if specified.
3. Items marked "★" are normally carried in stock by Alcoa.

Design
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(11)



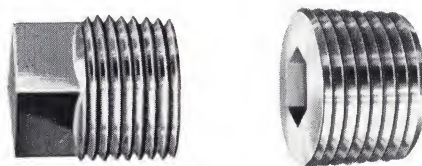
FASTENERS AND SCREW MACHINE PRODUCTS

ADDITIONAL STANDARD ITEMS MADE TO ORDER

The items listed below, although not carried in stock, can be made up on special order to customer's design or to standard specifications.

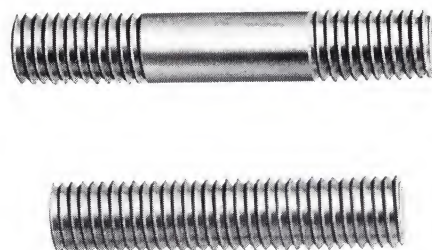
PIPE PLUGS

Square head and hexagon socket types.



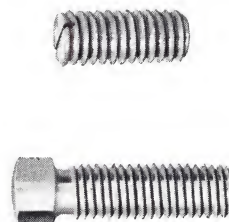
STUDS AND STUD BOLTS

May be made with same or different pitch thread on opposite ends or may be threaded continuously.



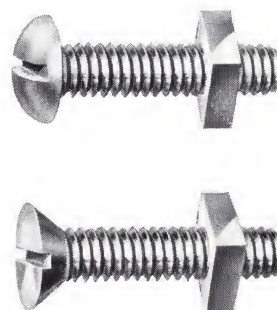
SET SCREWS

Headless or square head with any standard type point.



STOVE BOLTS AND NUTS

Round, flat, or oval countersunk head types. Shipped separately or assembled with nuts. For prompt shipment from stock we suggest substituting standard machine screws which are identical in design and dimensions except that threads are Class 2 fit whereas stove bolt threads are Class 1 fit. The term "stove bolt" is gradually becoming obsolete as the product is replaced by machine screws.



FASTENERS AND SCREW MACHINE PRODUCTS

ADDITIONAL STANDARD ITEMS MADE TO ORDER

The items listed below, although not carried in stock, can be made up on special order to customer's design or to standard specifications.



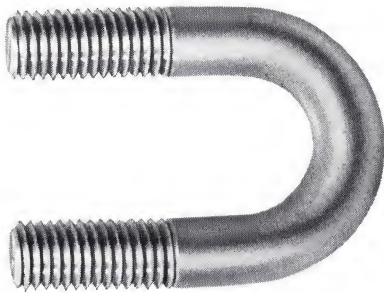
ANNULAR THREADED SCREWS OR FETTER RING NAILS

Rings can be rolled for partial or full length on most nail blanks.



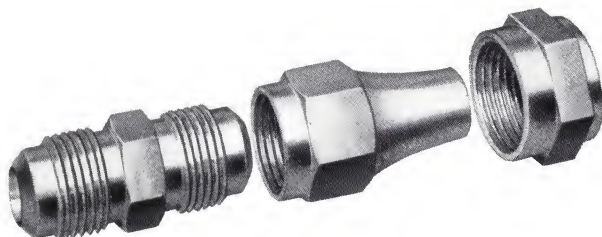
DRIVE SCREWS AND SCREW NAILS

Can be made in a variety of head types, with or without slots.



U-BOLTS

Diameters, lengths and threads to suit individual applications.

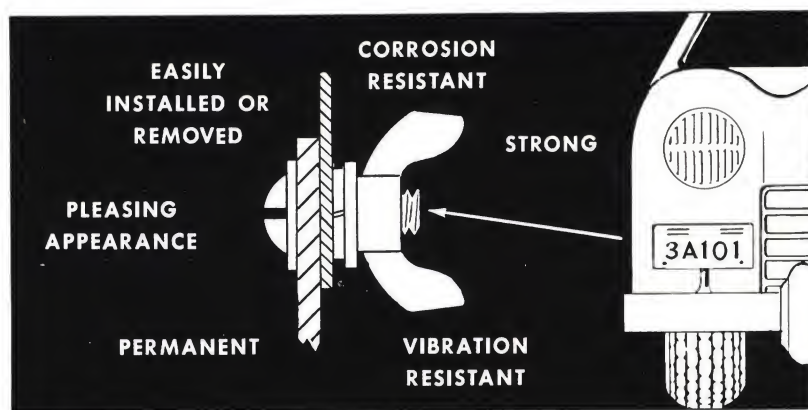


PIPE AND TUBE FITTINGS

Unions, connectors, nuts, etc., for standard pipe and flared tube connections.

ALCOA

LICENSE PLATE FASTENERS



Good looking, high strength, precision made fasteners for use where the motorist has most frequent occasion to appreciate their trouble-free service. Alcoa license plate assemblies are composed of standard Alcoa aluminum fasteners and can be used for years without danger of red rust which makes other types of fasteners unsightly and difficult to assemble and disassemble after only short periods of service. Screw and nut are ball burnished to give a bright attractive finish which adds to the appearance of any car and is especially suitable for use with aluminum license plates.

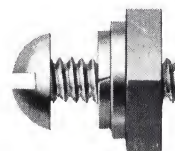
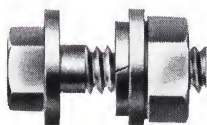
Individual parts may be purchased separately or as assembled units. Assembled units

can be attached to customers' display cards in sets of four if desired.

The standard license plate fastener assembly pictured above has been found most effective for average use. It permits secure tightening by hand, yet is strong enough so as not to be easily broken if pliers are applied to the nut. The lock washer prevents loosening from vibration and consequent rattles or possible loss of plates. The standard assembly consists of the following parts:

- 1/4—20 x 5/8 Washer Head Machine Screw
- 1/4—20 Wing Nut
- 1/4" Plain Washer
- 1/4" Lock Washer

If a slightly different type of license plate assembly is required, other Alcoa Aluminum fasteners may be combined in a variety of ways to give the desired result while retaining the advantages of a permanent trouble free fastening. Two such possible combinations are pictured here.



SECTION

(11)

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DESIGNING PARTS TO BE MADE AS SCREW MACHINE PRODUCTS

The purchaser of screw machine products can benefit himself to the extent of lower prices, better quality, and quicker delivery by giving adequate consideration to the method of manufacture when designing the product. This section devoted to suggestions on the design of screw machine parts is intended only to highlight some of the more important phases of the problem for the customer who is not too familiar with screw machine parts manufacture. The ideal situation would be for our production engineer to sit down with your product designer and discuss each part in detail. This is, of course, impractical, but by heeding the suggestions given here, and giving us as much information as possible concerning the part and the function it will perform, you can do much to assist us in supplying the part as you need it and as quickly and economically as possible. When requesting a quotation include as much of the following information as is available:

Print or sketch showing dimensions and tolerances.

Sample showing surface finish and general class of workmanship.

Assembly drawing or assembly itself showing how the part functions in relation to other parts.

CHOICE OF ALLOY

Alcoa 11S-T3 free machining aluminum alloy is generally the preferred material for most economical production of the normal variety of screw machine products. Its free machining characteristics facilitate production at minimum cost; it is among the stronger of the alloys; and its other physical and mechanical properties are suitable for a wide variety of applications. Other alloys may be selected when certain other properties are considered more important than machining economy. 24S-T4 and 17S-T4 are widely used for such items as aircraft fittings where highest strength is required. 61S-T6 is often specified where superior corrosion resistance is of benefit, and where parts are to be machined from tubing. 2S-H14 is sometimes required for high electrical conductivity, or where severe forming operations are to be performed after machining.

Table No. 19 on page 239 gives typical characteristics for the more common alloys used for screw machine products. Reference to this table will assist the designer in choosing the alloy having the highest machinability rating of those which are suitable in other respects.

TOLERANCES

It is preferable to have every dimension on a drawing carry a specific tolerance as an indication to the manufacturer of its importance. Dimensions should be given as fractions wherever possible, and tolerances should be as large as permissible. Standard commercial

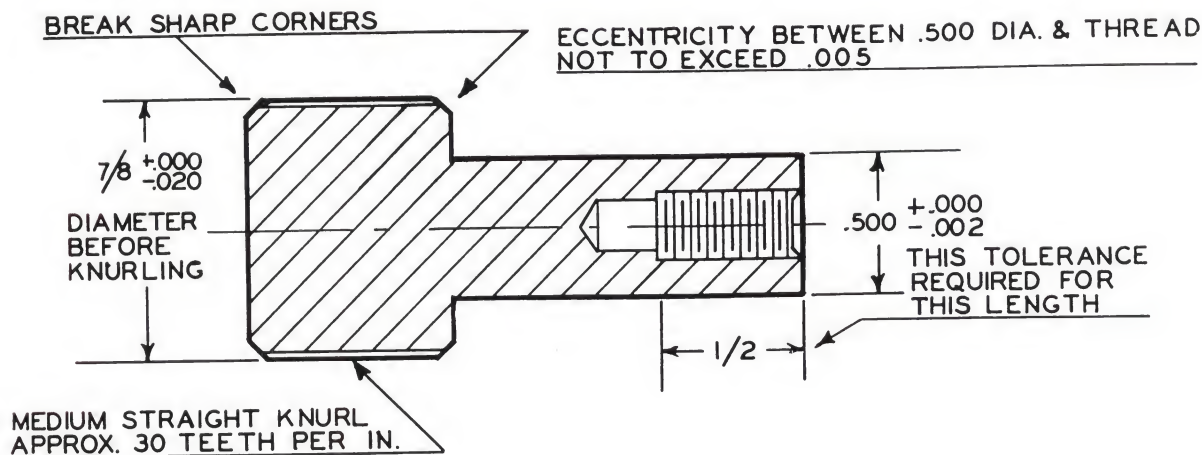
tolerances are given on page 246. These represent the closest tolerances which can be maintained on the normal variety of work without undue added cost for machining and inspection. Closer tolerances are possible in most cases at added expense and in some cases more liberal tolerances will result in decreased cost.

Because of the added cost, purchasers of screw machine products should specify close tolerances only on those dimensions which are critical to the proper functioning of the part. The use of a close general tolerance, of for instance $\pm .002$ ", should be avoided if only one or two of many dimensions need to be held to these limits.

In many cases, *diameters* need be held to close tolerances only for a limited length. A notation to this effect on the drawing will save needless expense in machining.

Knurled sections can usually be dimensioned by giving the diameter of the stock before knurling and the approximate pitch (teeth per inch) of the knurl only. When the diameter over the knurl must be held to close limits it is usually necessary to form this section after knurling, thereby producing a truncated knurl.

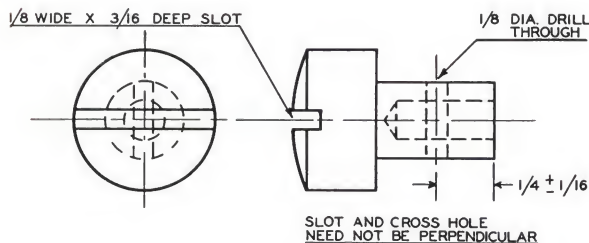
Eccentricity tolerances (see page 246 for definition) should be used only where the concentricity of certain sections is important to the use of the part. In these instances the maximum permissible eccentricity should be noted as well as the particular surfaces to which it applies.



TOLERANCE $\pm .010$ UNLESS OTHERWISE SPECIFIED

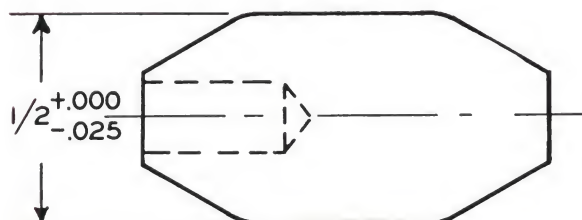
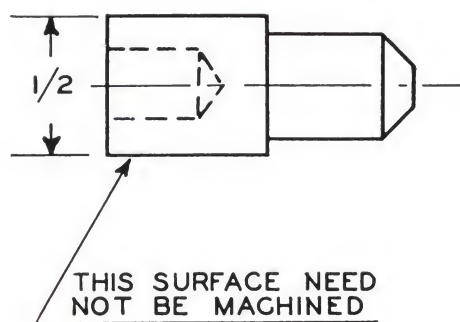
LOCATIONS

The location of cross holes, slots, milled sections, trade marks, and similar features, like all other dimensions, can be held to close tolerances only at increased expense. Often these features can be subject to wide location tolerance without affecting the functioning of the part, and this should be so noted on the drawing. When several such operations are to be performed the drawing should specify whether any angular relation must be maintained between them.



OUTSIDE DIMENSIONS

If the outside surface (or a portion thereof) need not be machined, this dimension should be specified as a standard fractional rod or bar size. The tolerance on such a surface should in no case be closer than that which exists on the raw material. A note should be added to the drawing indicating that this surface need not be machined.



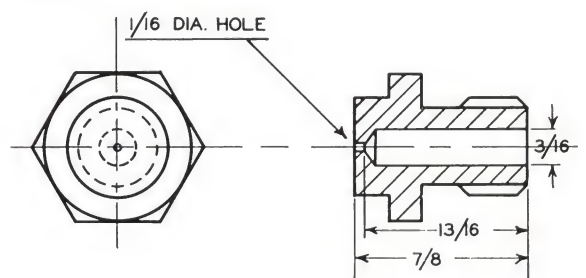
MACHINE ALL OVER

Where the outside surface should be machined for appearance, but need not be held to a close tolerance, this dimension should be specified as a standard fractional rod size with a liberal minus tolerance. This tolerance should be no less than the rod tolerance plus .010" for stock to 3/8" diameter, .020" for stock to 1-1/2" diameter, and 1/32" for stock over 1-1/2" diameter (see page 242 for rod tolerances). This will permit machining the outside diameter without resorting to the use of oversize rod.

DRILLED HOLES

Table No. 14 on pages 233-235 has been included in this catalog as a convenient reference to standard drill sizes and corresponding drill point lengths. Whenever possible a drill size from this chart should be chosen instead of a special size and the normal point angle allowed at the bottom of the hole. In some cases slightly flatter drill angles can be used, but whenever a flat bottom hole is specified it is likely that additional expense will result.

Holes deeper than six times their diameter become increasingly difficult and expensive to drill. Wherever possible the hole diameter should be increased in such cases. In many instances where a larger hole is not permissible for the full length, it is possible to design the part with a large hole for the major portion of the total length and a smaller hole for a short length at one end only. The small diameter hole should be placed at the cutoff end of the part if possible to facilitate completion in one operation.



THREADS

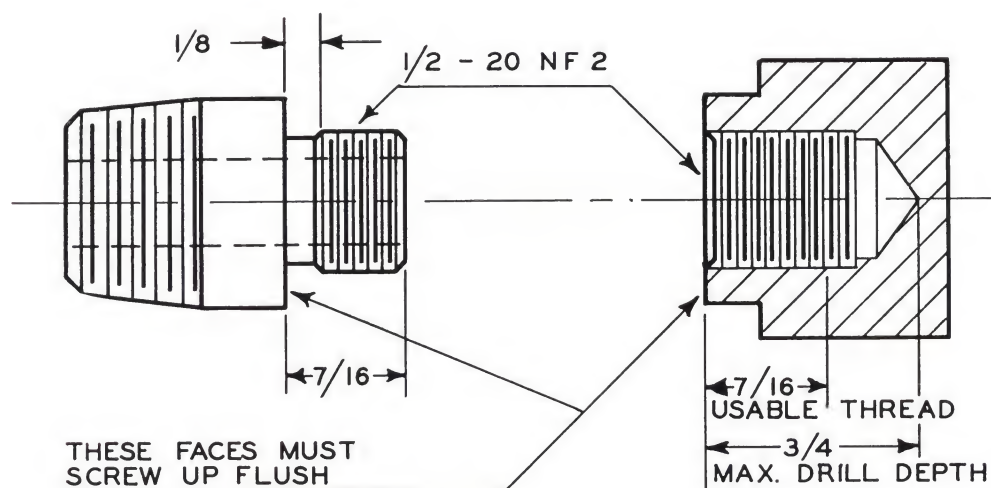
Tools and gages for producing parts with special threads are costly and often cause considerable delay in delivery due to the time required to procure them. Standard threads in the American National Coarse, Fine, or Extra Fine thread series should be chosen wherever possible. Table No. 9 on page 227 lists threads

and fits for which tools and gages are maintained by Alcoa; the use of threads included in this table will result in fastest delivery at lowest cost. Certain special threads for which tools are available will be recommended as substitutions on specific quotations. It would be impractical, however, to list specifications for such special threads in this booklet.

Class 2—free fit threads should be specified for the normal variety of screw machine work. Class 3 medium fit threads are used on special types of work where close tolerance precision threads are necessary; the closer limits naturally result in increased machining and inspection costs. As explained in more detail under the section on Screw Thread Data, two new classes of thread fits have recently been added by the adoption of American Standard B1.1—1949. These are Class 2-A for external threads and Class 2-B for internal threads, and Class 3-A for external threads

part or a counterbore in the female part of sufficient width to clear the imperfect threads. Threads should not be required to be tapped closer than 5 threads or $5/32$ " from the bottom of a blind hole whichever is greater. Even larger clearances are advisable in the case of very deep holes.

In the case of an internal thread, the difference between the major diameter of the thread cut by the tap and the minor diameter cut by the tap drill is called the depth of thread. The relation which this depth bears to the full depth of the theoretical basic thread form is known as the percentage depth of thread. Drill sizes which result in a depth of thread greater than 65%–75% should be avoided since tapping costs will be increased without resulting in any significant increase in strength. For small diameter taps and deep holes the drill size should be further increased to give even a lower percentage of thread; wherever pos-



and 3-B for internal threads. The use of Class 2-A and 2-B threads for mating parts provides a pitch diameter allowance between the parts and facilitates free fitting assembly by hand. Class 3-A and 3-B threads give a fit without a pitch diameter allowance, but provide tolerances somewhat greater than Class 3 threads.

Threading close to a shoulder or tapping close to the bottom of a hole results in tool breakage and reduced production and should, therefore, be avoided. Usable external threads should not be required closer than $2\frac{1}{2}$ threads or $1/16$ " from a shoulder whichever is greater. If a female part is to thread up flush with the shoulder, provide an undercut on the male

sible, however, deep tapped holes should be avoided entirely. Table No. 13 on pages 229-232 gives the percentage depth of thread resulting from the use of standard stock drill sizes as well as the recommended maximum depth of usable thread in a tapped hole and the recommended minimum clearance at the bottom of the hole.

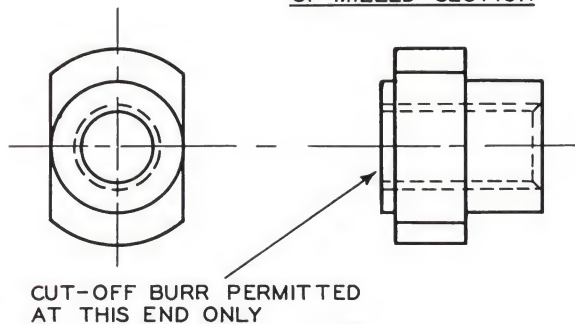
BURRS AND SHARP CORNERS

A cutoff burr left by the tool which parts the finished piece from the bar of stock is characteristic of all parts produced on screw machines. The size, shape, and location of the

burr is dependent on the size of the part, type of material, whether section cut off is solid or hollow, and other factors. The cost of removing the burr is also subject to great variation, from next to nothing in some cases to an amount as great as the cost of machining the part in others. It is, therefore, important that the customer specify whether or not the burr must be removed. The same situation exists in the case

STRADDLE MILL

BREAK ALL SHARP
CORNERS EXCEPT EDGES
OF MILLED SECTION



of burrs resulting from cross drilling, milling, slotting or similar operations.

Closely related to the problem of burrs is that of sharp corners versus broken or chamfered corners at the junction of any two surfaces on

a screw machine part. In some cases sharp corners may be desirable, while in others a slight break will be preferred. It is important in either case that the customers requirements be covered by a note on the drawing. Corners resulting from the intersection of two turned surfaces can usually be chamfered slightly during the original machining operation at no increase in cost. Corners at the intersection of a turned surface and an unturned surface, such as the flat of hex stock or a milled section, must usually be chamfered by means of an extra operation at considerable increase in cost.

FINISH

A description of the various finishes which can be applied to aluminum screw machine products is given on pages 211 and 212. Unless otherwise specified, parts will be furnished with a commercial quality machine finish. General terms such as bright finish, satin finish, or polished finish, do not always mean the same thing to all people. It is therefore, wise to submit a sample representing the finish desired to assist the manufacturer in deciding upon the most economical sequence of operations to produce the required result.

FINISHES FOR ALCOA ALUMINUM SCREW MACHINE AND UPSET PRODUCTS

MECHANICAL FINISHES

The following mechanical finishes are listed in approximate order of cost with the least expensive first and the most expensive last. Since the cost of finishing operations depends largely upon the size and shape of the part this cost relation may not apply in every case.

MACHINE FINISH

The term machine finish is used to designate the finish which exists as the result of a sequence of manufacturing operations which are required to produce the part, but none of which has as its primary purpose the production of a particular type or quality of surface or appearance. Certain products which are subjected to heat treatment as a last operation will

have a characteristically darkened surface. Parts machined from rod or bar on a screw machine will have an actual machined surface which will vary from section to section depending on the type of tool which did the cutting. Such parts will have the oxide finish on any portion of the rod or bar stock which is unmachined. Parts can be shipped in bulk without harm to finish in most cases; large parts or parts having sharp corners, thin edges, or fine threads may require special packing.

TUMBLER FINISH

Small aluminum parts are sometimes barrel tumbled, either alone or with abrasive pellets, powdered emery, sawdust, etc. This operation usually is for the purpose of rounding over

sharp corners, removing burrs, or preparing the parts for subsequent additional finishing operations. It is impossible to describe the character of the finish produced since it varies considerably with the type of abrasive, previous condition of the surface, etc. In general a tumbled finish should be specified when freedom from external burrs and sharp corners is desired without concern for the appearance of the surface finish. This method of finishing is impractical for close tolerance precision parts, large parts, or parts having threads, sharp corners, or thin edges. Parts may be shipped in bulk without damage.

BRIGHT (BALL BURNISHED) FINISH

The term "bright finish" is used by Alcoa to designate the finish produced on small screw machine or upset products by burnishing in a tumbling barrel with steel balls or cones. This finish is comparable to a good grade of nickel-plate and is the most durable of the mechanical finishes for aluminum products of this type. All standard machine screws, wood screws, and sheet metal screws are finished by this process unless otherwise specified. Due to the nature of the operation it cannot be applied to large heavy parts or parts having thin edges since such products will suffer damage when striking each other within the rotating barrel. It is possible with particular care to ball burnish some parts having external or internal threads. The resulting finish is usually less bright, however, since the time in the burnishing barrel must be reduced to prevent damage to the threads. Wherever possible, parts should be threaded after burnishing. Parts may be shipped in bulk without damage.

CENTERLESS GROUND FINISH

Certain parts having a straight cylindrical outside diameter for their entire length, or the greater percentage thereof, can be furnished with a centerless ground finish on this cylindrical section. This method is frequently used for tubes, bushings, and similar parts. Small parts may be shipped in bulk; large parts should be specially packed to prevent rubbing together in transit.

SCRATCHBRUSH FINISH—SATIN FINISH

The application of a rotating wire brush to an aluminum part produces a coarse-line finish which is desirable for certain uses. Satin finish is a modification of the scratchbrush finish and is obtained by treatment with a finer

wire brush wheel or by abrasives. This type of finish is most often applied to large surfaces such as on pans, plates and trays, but may sometimes be required on small screw machine or upset products which are used in assembling such articles. Parts may require protective packing.

OILED FINISH

"Oiling" and "greasing" are terms used to denote a polishing operation with fine grit emery suspended in a lubricant of tallow, oil, or beeswax. This operation produces a fine-lined surface similar to a fine or medium machine grind except of course, that being a hand operation the lines will not be parallel on all surfaces of the part. The oiling procedure is usually used as a preliminary operation to final buffing, but may in some cases be used to produce a final finish similar to a satin finish. Parts may require protective packing.

BUFFED FINISH

A buffed finish is produced with a fine abrasive and results in a polished surface which brings out the high luster of the metal. In addition to the polishing action, the buffing operation removes minor surface scratches or lines such as result from preliminary grinding or oiling operations. Larger scratches resulting from handling, pits, nicks, etc. will not be removed by buffing and may appear more objectionable in contrast than before the part is buffed. Therefore, if a flawless high luster surface is required it is important that the proper preliminary conditioning operations precede buffing. Unless otherwise specified it will be assumed that these operations are desired wherever buff finish is called for. Parts should be individually wrapped or otherwise protected for shipment.

COLOR-BUFFED FINISH

A second buffing operation with the finest abrasive produces what is known as a color-buffed finish. This is the highest grade finish available on screw machine and upset products and brings out to the fullest the luster and high gloss characteristic of aluminum. It is only applied to parts which have had an initial buffing operation preceded by the required preparatory grinding and oiling operations to remove all surface imperfections. The color buffing operation removes any trace of fine buff lines remaining after the first buffing operation. Because of its extremely high polish

the surface will show scratches and handling marks very readily and is, therefore, rarely used without some protective coating or anodizing. Parts must be individually wrapped in tissue for shipment unless Alumilite finished.

CHEMICAL FINISH

CHEMICAL ETCH

Etching is an economical and convenient method of imparting a uniform frosted finish to aluminum parts. The solution produces a microscopic roughing of the surface which gives it a light-diffusing texture. Since this action takes place also in nicks, scratches and other imperfections these marks are usually made less conspicuous by this operation. Because of the roughening action of the solution, this finish is not normally applied to threaded parts. Etched parts which are in contact with each other in transit may show rub marks, and it is, therefore, necessary to use protective packaging in some cases.

ELECTROCHEMICAL FINISH

The oxide coatings formed on aluminum by anodic treatment constitute one of the most important classes of finishes for aluminum and are applicable to most screw machine and upset products. The patented Alumilite process includes a group of special procedures by which anodic oxide coatings are applied to aluminum and its alloys.

Alumilite coatings can be made both protective and decorative. In some applications, protection—such as protection against weather, wear, or chemical attack—is the primary duty of the coatings. In other cases, beauty of finish is the objective. Sometimes a combination of both characteristics is desired. Alumilite coatings also offer an excellent base for the application of paints, enamels, and lacquers.

The oxide coating reproduces the texture of

the surface from which it is formed. On a smooth, polished surface, the oxide coating has a luster which is attractive to the eye and a texture which is pleasing to the touch. Whether the metal surface be buffed, satin-finished, ground, or machined, the texture is retained in the oxide coating and is protected against change during service.

The color of the coating as formed will be determined by the nature of the aluminum alloy and the coating procedure employed. The coating will range from a substantially clear, transparent film to one that is either translucent or opaque. Usually the coating exhibits some of the metallic sheen of the underlying metal, giving a uniquely attractive appearance to the article. The dark color resulting from heat treatment, if not removed prior to application of the Alumilite finish will show in the Alumilite coating. Where maximum uniformity of appearance is required in an Alumilite-finished assembly, all parts of the assembly should be of the same alloy and temper.

The Alumilite coating, as initially formed, is filled with myriads of pores too fine to be seen under a microscope. This minutely porous structure is a valuable characteristic of the coating and can be used to good advantage. For example, when it is desired to preserve the initial appearance of the coating, sealing treatments are available which close the pores and make the coating resistant to staining. When protection is the main consideration, corrosion inhibitors, such as chromates may be adsorbed and sealed within the pores. This procedure is often used when the coating is to form the base for a protective paint or enamel. These same pores provide a means of coloring the coating throughout its depth, for there are many dyes which can be adsorbed from solution to give a unique colored finish with the luster of the metal shining through the dyed oxide coating. Since the dye colored coatings are not completely resistant to fading, their use in direct sunlight is not recommended.

ALCOA RIVETS—GENERAL INFORMATION

ALLOYS, TEMPER AND DRIVING PROCEDURES

2S-F

These relatively soft rivets are always driven cold as received. If maximum softness is desired, 2S-O may be ordered.

A17S-T4

Rivets are furnished in the heat-treated condition and are driven cold as received. While not equal in strength to 17S-T4 rivets, they are so nearly alike that they have been substituted for 17S-T4 rivets in many applications. They eliminate the reheat treatment and cold storage necessary on many sizes of 17S-T4 rivets.

17S-T4

Rivets are usually furnished in the heat-treated condition and small sizes may be driven cold in the as-received condition. Larger sizes require reheat treatment and refrigerated storage unless they are to be driven within a few hours after treatment.

24S-T4

These are the strongest and most difficult to drive of the aluminum rivets. Their use is generally confined to the smaller sizes. They are supplied heat treated but should be reheat treated and kept in refrigerated storage until ready to drive.

53S-T61

Rivets are supplied in the heat-treated condition and are cold driven as received. Their mechanical properties are stable and they may be stored indefinitely. A slightly stronger rivet may be had in 53S-T6 with increased driving pressure. In smaller sizes where driving pressure is not important, they might be considered somewhat better than 53S-T61.

56S-H32

These rivets possess good strength with medium driving characteristics. They are supplied in the cold-worked temper and driven as received. They are used extensively for magnesium work.

HOT DRIVING

Both 17S-T4 and 53S-T4 rivets of the larger sizes may be hot driven by heating to the proper temperature and holding for 5 to 30 minutes depending on the size. By driving immediately upon removal from the furnace the contact with the cold work gives a satisfactory quench. Their properties are developed by natural aging after driving.

FINISH

MACHINE FINISH

Unless otherwise specified rivets are shipped with machine finish which is the natural finish resulting from the manufacturing operations and includes an oxide discoloration on those rivets which are heat treated after heading.

BURNISHED FINISH

Small and medium size rivets can be burnished to produce a bright lustrous finish if required.

ALUMILITE FINISH

Rivets may be supplied with several of the Alcoa Alumilite finishes described elsewhere in this book. In the case of rivets where the alumilite coating is required for corrosion resistance and/or color identification it is usually applied to the machine finish rivet without any preliminary finishing operations.

PACKING

Unless otherwise specified, rivets are packed for shipment in bulk. Rivets may be packaged in one pound boxes where so specified on special order.

SHIPPING TOLERANCE

Normal shipping tolerance for rivets is plus or minus 10% of the quantity ordered.

STOCKS

Several authorized Alcoa Distributors maintain stocks of Alcoa aluminum rivets available for quick delivery. The sizes, alloys, and head types carried in stock are subject to considerable variation depending on the particular warehouse and therefore cannot be listed in this catalog. No rivet stocks are maintained by Alcoa.

TOLERANCES

Standard rivets are manufactured to either of two general classes of tolerance known respectively as "commercial" and "aircraft".

Commercial tolerance rivets are used for most types of general riveting work and fulfill the tolerance requirements of Navy Department Specification 43R5g.

Aircraft tolerance rivets are used where closer-than-commercial tolerances are required in aircraft construction work. Aircraft tolerances fulfill the tolerance requirements of Army-Navy Aircraft drawings for rivets with the exception of drawings AN426 and AN456 for which special tolerances apply. Tolerances closer than Aircraft Standard may be supplied in some cases at extra cost.

Unless otherwise specified, standard rivets will be manufactured to commercial tolerances.

Special rivets or special upset head parts will have special tolerances dependent on the type and size of the part.

RIVET TOLERANCES— COMMERCIAL

DIAMETER OF SHANK

DIMENSIONS IN INCHES

Nominal Diameter	Minus	Plus
.052 to 3/32	.002	.004
over 3/32 to 5/32	.002	.005
over 5/32 to 7/32	.003	.006
over 7/32 to 3/8	.003	.008
over 3/8 to 5/8	.005	.010
over 5/8 to 3/4	.006	.012
over 3/4 to 1"	.007	.015

LENGTH OF SHANK

All diameters to 3/4" inclusive plus or minus 1/64".

All diameters over 3/4" plus or minus 1/32".

DIAMETER OF HEAD

All rivets with shank diameters to and including 3/4" plus or minus 8% of nominal head diameter, but in no case less than $\pm .010$ ", and in no case greater than $\pm 1/32$ ".

All rivets with shank diameters over 3/4" plus or minus .047".

HEIGHT OF HEAD

Plus or minus 8% of nominal head height, but in no case less than $\pm .010$ " or more than $\pm .025$ ".

OUT-OF-ROUNDNESS OF HEAD AND ECCENTRICITY OF HEAD IN RELATION TO SHANK

DIMENSIONS IN INCHES

Nominal Head Diameter	Total dial indicator reading resulting from eccentricity and out-of-roundness not to exceed:
up to 1/4"	.015
over 1/4 to 3/8"	.020
over 3/8 to 1"	.025
over 1 to 1-1/2"	.030
over 1-1/2"	.047

RIVET TOLERANCES— AIRCRAFT

DIAMETER OF SHANK

DIMENSIONS IN INCHES

Nominal Diameter	Minus	Plus
.062 to .094	.001	.003
.125	.001	.0035
.156 to .375	.001	.004
.437 to .625	.007	.010

LENGTH OF SHANK

Plus or minus .010".

DIAMETER OF HEAD

Plus or minus 5% of nominal head diameter but in no case greater than $\pm .025$ ".

HEIGHT OF HEAD

Plus or minus 5% of nominal head height, but in no case less than $\pm .005$ ".

OUT-OF-ROUNDNESS OF HEAD AND ECCENTRICITY OF HEAD IN RELATION TO SHANK

DIMENSIONS IN INCHES

Nominal Shank Diameter	Total dial indicator reading resulting from eccentricity and out-of-roundness not to exceed:	
	Countersunk type head	Oval, round, and brazier type heads
.062, .094, .125	.010	.010
.156, .187	.010	.015
.250	.010	.020
.312, .375	.015	.020



CHAMFERED SHANKS

Alcoa aluminum rivets are normally furnished with square shank ends. Certain sizes can be supplied with a chamfer on the end of

the shank as outlined in the table below, however, the chamfered shank will be supplied only when specifically requested by the customer.

Manufacturing Limits for Standard Chamfered Shank Rivets

Length Inches	Diameter Head and Type															
	1/16		3/32		1/8		5/32		3/16		1/4		5/16		3/8	
	*A	*B	*A	*B	*A	*B	*A	*B	*A	*B	*A	*B	*A	*B	*A	*B
1/16	✓	✓														
1/8	✓	✓	✓	✓	✓	✓										
3/16	✓	✓	✓	✓	✓	✓	✓	✓								
1/4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
5/16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
3/8	✓	✓†	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
7/16	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
1/2	✓†	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
9/16	□	□	✓	✓†	✓	✓	✓	✓	✓	✓	✓	✓	✓			
5/8	□	□	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
11/16	□	□	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
3/4	□	□	✓†	□	✓	✓†	✓	✓	✓	✓	✓	✓	✓		✓	
13/16	□	□	✓	□	✓	✓	✓	✓	✓	✓	✓		✓	
7/8	□	□	✓	□	✓	✓	✓	✓	✓	✓	✓		✓	
15/16	□	□	✓†	□	✓	✓†	✓	✓	✓	✓	✓		✓	
1	††	††	□	□	✓†	□	✓	□	✓	✓	✓	✓	✓		✓	
1-1/8	□	□	✓	□	✓	✓†	✓	✓	✓		✓	
1-3/16	□	□	✓	□	✓	□	✓	✓	✓		✓	
1-1/4	□	□	✓†	□	✓	□	✓	✓	✓		✓	
1-3/8	□	□	□	□	✓	□	✓	✓	✓		✓	
1-7/16	□	□	□	□	✓	□	✓	✓	✓			
1-1/2	††	††	□	□	□	□	✓†	□	✓	✓†	✓	†	†
1-9/16	□	□	□	□	✓	□	✓			
1-5/8	□	□	□	□	✓	□				
1-3/4	□	□	□	□	✓	□				
1-7/8	□	□	□	□	✓†	□	†	†	
2	††	††	□	□	□	□		□	†	†	
2-1/2	††	††								
3			††	††						
4					††	††				
5							††	††	††	††

*A—Covers Standard Round, Button, Mushroom, Brazier and Modified Brazier Heads.

*B—Covers Standard Flat, 78° and 100° Countersunk Heads.

✓—Indicates sizes that chamfer tools are available for Radius Type Chamfer. Refer to Illustration No. 1, below.

□—Indicates sizes that chamfer tools are available for Bevel Type Chamfer. Refer to Illustration No. 2, below.

For sizes not identified by symbol ✓ or □ obtain tool charge from Alcoa.

†—Maximum lengths for ✓ Radius Type Chamfer.

††—Maximum lengths for □ Bevel Type Chamfer.

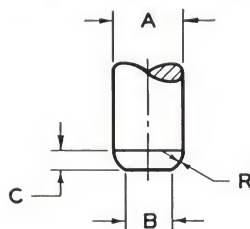


ILLUSTRATION NO. 1

✓ Radius type chamfer

A=Shank diameter

B=Diameter of end flat

C=0.25 x A

Radius=0.3125 x A

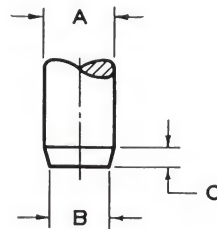


ILLUSTRATION NO. 2

□ Bevel type chamfer

A=Shank diameter

B=Approximate 0.86 x A

C=Approximate 0.25 x A

ALLOY IDENTIFICATION MARKS

Alcoa aluminum standard solid rivets are identified as to alloy by the markings shown below which are in accordance with Army-Navy Aircraft specifications insofar as applicable.

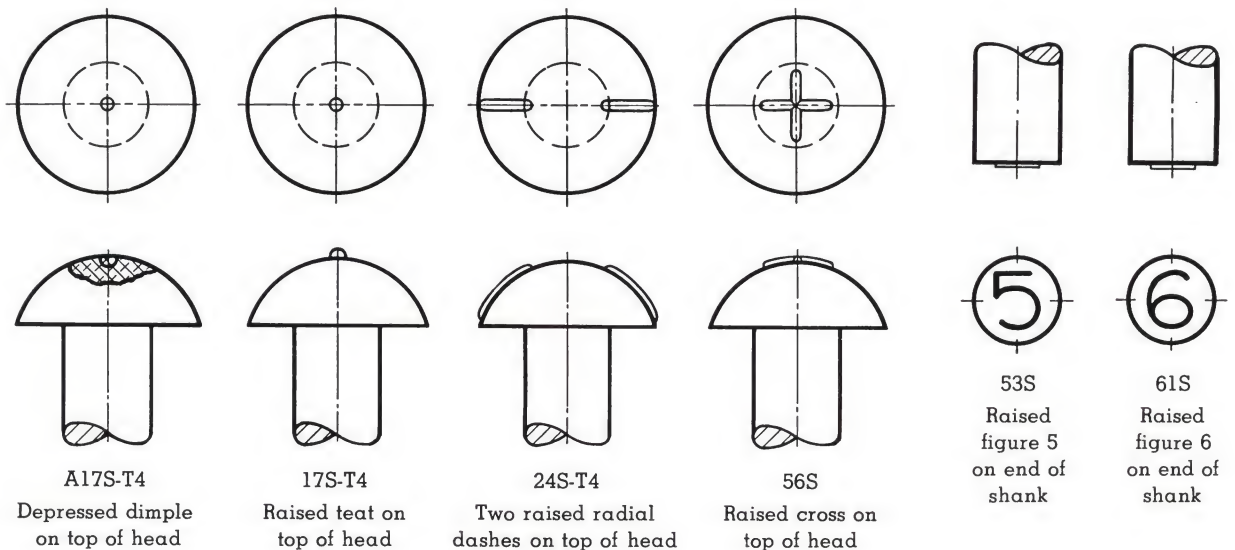
2S and 3S rivets do not normally carry an alloy identification mark but can be supplied with a raised figure 2 or figure 3 respectively on the end of the rivet shank if so specified.

Standard rivets which normally carry an

identification mark on the head will have the alloy identified by raised figures and letters on the end of the shank for sizes over 3/4" diameter.

Tubular rivets, and special rivets or upset products do not normally carry any alloy identification markings.

High button (acorn) head rivets will have the alloy identified by raised figures and letters on the end of the shank.



SCREW THREAD INFORMATION

This reference section on Screw Threads is intended to define the thread dimensions which will be held on ALCOA standard fasteners as well as to list the sizes and pitches of threads which should be used wherever possible when designing special screw machine products.

The following data are based on the American Standard for Unified and American Screw Threads for Bolts, Nuts and Other Threaded Parts, B1.1-1949, approved by the American Standards Association (ASA). This standard has been developed, under the joint administrative leadership of the American Society of Mechanical Engineers and the Society of Automotive Engineers, by committee B1 on Screw Threads, organized under ASA procedure. Cooperation with similar committees in Great Britain and Canada has resulted in the unification of the major American and British thread systems.

The American system of coarse and fine threads was originally developed in 1864 by William Sellers, and adopted in 1918, with some modifications, by the National Screw Thread Committee (NSTC) which added limiting dimensions providing for four classes of fit between external and internal threads. Basing on the first NSTC report, ASA committee B1 developed an American Standard which was approved in 1924 and revised in 1935 (B1.1-1935).

The British system of commonly used coarse and fine fastening threads originated in 1845 with Joseph Whitworth and was published in 1940 as the British Standard for Screw Threads of Whitworth Form (BS 84:1940).

The Canadian industry, which receives orders from the United States as well as from Great Britain, has been obliged for many years to work to the American, as well as to the British Standard.

The new American, British and Canadian Standards are the same as to technical content. Therefore, threaded parts made to these standards are completely interchangeable, independent of their origin.

BASIC SCREW THREAD DATA

The basic data that determine the type and size of a screw thread are the thread form; the major diameter; the minor diameter; the pitch diameter; and the pitch. These details are shown in the diagram on this page.

THREAD FORM

The thread form has a 60 degree thread angle. The external thread (as on a screw or bolt) has a rounded root and either a flat or a rounded crest. The internal thread (as in a nut or tapped hole) has a flat crest and root.

MAJOR DIAMETER

The major diameter is the diameter of the imaginary co-axial cylinder which bounds the crest of an external thread or the root of an internal thread.

MINOR DIAMETER

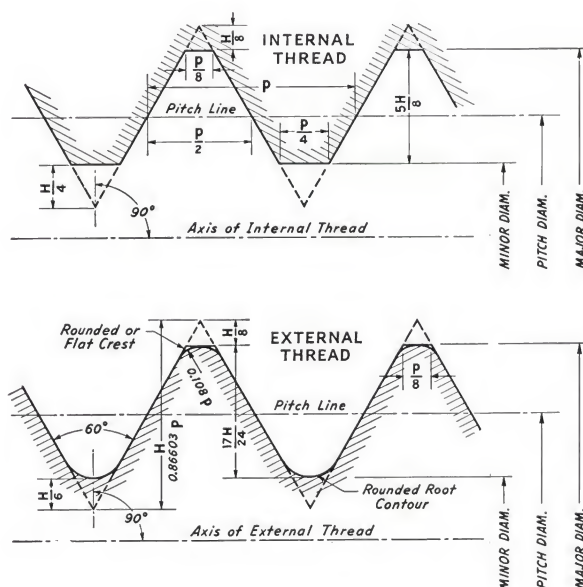
The minor diameter is the diameter of the imaginary co-axial cylinder which bounds the root of an external thread or the crest of an internal thread.

PITCH DIAMETER

The pitch diameter is the diameter of the imaginary co-axial cylinder, the surface of which would pass through the thread profiles at such points as to make the width of the groove equal to one-half of the basic pitch. On a perfect thread this occurs at the point where the widths of the thread and groove are equal.

PITCH

The pitch of a thread is the distance, measured parallel to its axis, between corresponding points on adjacent thread forms in the same axial plane and on the same side of the axis.



THREAD SERIES

The American Standard B1.1-1949 covers series of coarse, fine, extra-fine, 8-pitch, 12-pitch and 16-pitch threads, and special threads.

TOLERANCE CLASSES

Class 2, free fit, limiting dimensions have been used generally for fasteners and screw machine products in the past and Class 3, medium fit, limiting dimensions have been used in special cases. These classes of fit have been retained without change in the new standard because of their wide use in past and present practice. Two new sets of limiting dimensions which will be used in fastener and screw machine product work have been added to the new standard, as follows:

Class 2A for external, and Class 2B for internal threads give a fit with a pitch diameter allowance. These classes are intended to become the recognized standard for the normal production of bolts, nuts and screws.

Class 3A for external, and Class 3B for internal threads give a fit without a pitch diameter allowance. This fit is about the same as the Class 2 fit given in B1.1-1935.

The threaded fasteners illustrated and described throughout this book have been and are presently being manufactured to Class 2 or Class 3 fits as noted on the individual pages. This practice will continue until such time as the standard specifications to which these items are produced by Alcoa and other fastener manufacturers are modified to incorporate the new classes of fit. It is expected that externally threaded fasteners now made to Class 2 dimensions will eventually be made to Class 2A dimensions while internally threaded parts will be produced to Class 2B dimensions. Certain aircraft fasteners presently being produced to Class 3 tolerances may in the future be made to Class 3A for external and 3B for internal threads.

These changes may not be started for some time and will certainly take an appreciable length of time to complete. No inconveniences should result to the user of fasteners, however, since the dimensional changes are all in a direction which will increase the clearance between internally and externally threaded members and consequently old and new parts may be used interchangeably without danger of interference.

TABLE No. 1

Limiting Dimensions

American National COARSE THREAD Series—CLASS 2, FREE FIT

DIMENSIONS IN INCHES

Sizes	Threads Per Inch	Screw Sizes					Nut Sizes					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
1	64	0.0730	0.0692	0.0629	0.0610	0.0538	0.0561	0.0623	0.0629	0.0648	0.0730	0.073
2	56	0.0860	0.0820	0.0744	0.0724	0.0641	0.0667	0.0737	0.0744	0.0764	0.0860	0.086
3	48	0.0990	0.0946	0.0855	0.0833	0.0734	0.0764	0.0841	0.0855	0.0877	0.0990	0.099
4	40	0.1120	0.1072	0.0958	0.0934	0.0813	0.0849	0.0938	0.0958	0.0982	0.1120	0.112
5	40	0.1250	0.1202	0.1088	0.1064	0.0943	0.0979	0.1062	0.1088	0.1112	0.1250	0.125
6	32	0.1380	0.1326	0.1177	0.1150	0.0997	0.1042	0.1145	0.1177	0.1204	0.1380	0.138
8	32	0.1640	0.1586	0.1437	0.1410	0.1257	0.1302	0.1384	0.1437	0.1464	0.1640	0.164
10	24	0.1900	0.1834	0.1629	0.1596	0.1389	0.1449	0.1559	0.1629	0.1662	0.1900	0.190
12	24	0.2160	0.2094	0.1889	0.1856	0.1649	0.1709	0.1801	0.1889	0.1922	0.2160	0.216
1/4	20	0.2500	0.2428	0.2175	0.2139	0.1887	0.1959	0.2060	0.2175	0.2211	0.2500	0.250
5/16	18	0.3125	0.3043	0.2764	0.2723	0.2443	0.2524	0.2630	0.2764	0.2805	0.3125	0.3125
3/8	16	0.3750	0.3660	0.3344	0.3299	0.2983	0.3073	0.3184	0.3344	0.3389	0.3750	0.3750
7/16	14	0.4375	0.4277	0.3911	0.3862	0.3499	0.3602	0.3721	0.3911	0.3960	0.4375	0.4375
1/2	13	0.5000	0.4896	0.4500	0.4448	0.4056	0.4167	0.4290	0.4500	0.4552	0.5000	0.5000
9/16	12	0.5625	0.5513	0.5084	0.5028	0.4603	0.4723	0.4850	0.5084	0.5140	0.5625	0.5625
5/8	11	0.6250	0.6132	0.5660	0.5601	0.5135	0.5266	0.5397	0.5660	0.5719	0.6250	0.6250
3/4	10	0.7500	0.7372	0.6850	0.6786	0.6273	0.6417	0.6553	0.6850	0.6914	0.7500	0.7500
7/8	9	0.8750	0.8610	0.8028	0.7958	0.7387	0.7547	0.7689	0.8028	0.8098	0.8750	0.8750
1	8	1.0000	0.9848	0.9188	0.9112	0.8466	0.8647	0.8795	0.9188	0.9264	1.0000	1.0000
1-1/8	7	1.1250	1.1080	1.0322	1.0237	0.9497	0.9704	0.9858	1.0322	1.0407	1.1250	1.1250
1-1/4	7	1.2500	1.2330	1.1572	1.1487	1.0747	1.0954	1.1108	1.1572	1.1657	1.2500	1.2500
1-1/2	6	1.5000	1.4798	1.3917	1.3816	1.2955	1.3196	1.3376	1.3917	1.4018	1.5000	1.5000
1-3/4	5	1.7500	1.7268	1.6201	1.6085	1.5046	1.5335	1.5551	1.6201	1.6317	1.7500	1.7500
2	4-1/2	2.0000	1.9746	1.8557	1.8430	1.7274	1.7594	1.7835	1.8557	1.8684	2.0000	2.0000
2-1/4	4-1/2	2.2500	2.2246	2.1057	2.0930	1.9774	2.0094	2.0335	2.1057	2.1184	2.2500	2.2500
2-1/2	4	2.5000	2.4720	2.3376	2.3236	2.1933	2.2294	2.2564	2.3376	2.3516	2.5000	2.5000
2-3/4	4	2.7500	2.7220	2.5876	2.5736	2.4433	2.4794	2.5064	2.5876	2.6016	2.7500	2.7500
3	4	3.0000	2.9720	2.8376	2.8236	2.6933	2.7294	2.7564	2.8376	2.8516	3.0000	3.0000
3-1/4	4	3.2500	3.2220	3.0876	3.0736	2.9433	2.9794	3.0064	3.0876	3.1016	3.2500	3.2500
3-1/2	4	3.5000	3.4720	3.3376	3.3236	3.1933	3.2294	3.2564	3.3376	3.3516	3.5000	3.5000
3-3/4	4	3.7500	3.7220	3.5876	3.5736	3.4433	3.4794	3.5064	3.5876	3.6016	3.7500	3.7500
4	4	4.0000	3.9720	3.8376	3.8236	3.6933	3.7294	3.7564	3.8376	3.8516	4.0000	4.0000

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.



TABLE No. 2
Limiting Dimensions
American National COARSE THREAD Series—CLASS 3, MEDIUM FIT
DIMENSIONS IN INCHES

Sizes	Threads Per Inch	Screw Sizes					Nut Sizes					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
1	64	0.0730	0.0692	0.0629	0.0615	0.0538	0.0561	0.0623	0.0629	0.0643	0.0730	0.073
2	56	0.0860	0.0820	0.0744	0.0729	0.0641	0.0667	0.0737	0.0744	0.0759	0.0860	0.086
3	48	0.0990	0.0946	0.0855	0.0839	0.0734	0.0764	0.0841	0.0855	0.0871	0.0990	0.099
4	40	0.1120	0.1072	0.0958	0.0941	0.0813	0.0849	0.0938	0.0958	0.0975	0.1120	0.112
5	40	0.1250	0.1202	0.1088	0.1071	0.0943	0.0979	0.1062	0.1088	0.1105	0.1250	0.125
6	32	0.1380	0.1326	0.1177	0.1158	0.0997	0.1042	0.1145	0.1177	0.1196	0.1380	0.138
8	32	0.1640	0.1586	0.1437	0.1418	0.1257	0.1302	0.1384	0.1437	0.1456	0.1640	0.164
10	24	0.1900	0.1834	0.1629	0.1605	0.1389	0.1449	0.1559	0.1629	0.1653	0.1900	0.190
12	24	0.2160	0.2094	0.1889	0.1865	0.1649	0.1709	0.1801	0.1889	0.1913	0.2160	0.216
1/4	20	0.2500	0.2428	0.2175	0.2149	0.1887	0.1959	0.2060	0.2175	0.2201	0.2500	0.250
5/16	18	0.3125	0.3043	0.2764	0.2734	0.2443	0.2524	0.2630	0.2764	0.2794	0.3125	0.3125
3/8	16	0.3750	0.3660	0.3344	0.3312	0.2983	0.3073	0.3184	0.3344	0.3376	0.3750	0.3750
7/16	14	0.4375	0.4277	0.3911	0.3875	0.3499	0.3602	0.3721	0.3911	0.3947	0.4375	0.4375
1/2	13	0.5000	0.4896	0.4500	0.4463	0.4056	0.4167	0.4290	0.4500	0.4537	0.5000	0.5000
9/16	12	0.5625	0.5513	0.5084	0.5044	0.4603	0.4723	0.4850	0.5084	0.5124	0.5625	0.5625
5/8	11	0.6250	0.6132	0.5660	0.5618	0.5135	0.5266	0.5397	0.5660	0.5702	0.6250	0.6250
3/4	10	0.7500	0.7372	0.6850	0.6805	0.6273	0.6417	0.6553	0.6850	0.6895	0.7500	0.7500
7/8	9	0.8750	0.8610	0.8028	0.7979	0.7387	0.7547	0.7689	0.8028	0.8077	0.8750	0.8750
1	8	1.0000	0.9848	0.9188	0.9134	0.8466	0.8647	0.8795	0.9188	0.9242	1.0000	1.0000
1-1/8	7	1.1250	1.1080	1.0322	1.0263	0.9497	0.9704	0.9858	1.0322	1.0381	1.1250	1.1250
1-1/4	7	1.2500	1.2330	1.1572	1.1513	1.0747	1.0954	1.1108	1.1572	1.1631	1.2500	1.2500
1-1/2	6	1.5000	1.4798	1.3917	1.3846	1.2955	1.3196	1.3376	1.3917	1.3988	1.5000	1.5000
1-3/4	5	1.7500	1.7268	1.6201	1.6119	1.5046	1.5335	1.5551	1.6201	1.6283	1.7500	1.7500
2	4-1/2	2.0000	1.9746	1.8557	1.8468	1.7274	1.7594	1.7835	1.8557	1.8646	2.0000	2.0000
2-1/4	4-1/2	2.2500	2.2246	2.1057	2.0968	1.9774	2.0094	2.0335	2.1057	2.1146	2.2500	2.2500
2-1/2	4	2.5000	2.4720	2.3376	2.3279	2.1933	2.2294	2.2564	2.3376	2.3473	2.5000	2.5000
2-3/4	4	2.7500	2.7220	2.5876	2.5779	2.4433	2.4794	2.5064	2.5876	2.5973	2.7500	2.7500
3	4	3.0000	2.9720	2.8376	2.8279	2.6933	2.7294	2.7564	2.8376	2.8473	3.0000	3.0000
3-1/4	4	3.2500	3.2220	3.0876	3.0779	2.9433	2.9794	3.0064	3.0876	3.0973	3.2500	3.2500
3-1/2	4	3.5000	3.4720	3.3376	3.3279	3.1933	3.2294	3.2564	3.3376	3.3473	3.5000	3.5000
3-3/4	4	3.7500	3.7220	3.5876	3.5779	3.4433	3.4794	3.5064	3.5876	3.5973	3.7500	3.7500
4	4	4.0000	3.9720	3.8376	3.8279	3.6933	3.7294	3.7564	3.8376	3.8473	4.0000	4.0000

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.



TABLE No. 3

Limiting Dimensions

Unified and American Standard COARSE THREAD Series—CLASS 2A and CLASS 2B FITS

DIMENSIONS IN INCHES

Sizes	Threads Per Inch	SCREW SIZES—CLASS 2A FIT					NUT SIZES—CLASS 2B FIT					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
1	64	0.0724	0.0686	0.0623	0.0603	0.0532	0.0561	0.0623	0.0629	0.0645	0.0730	0.073
2	56	0.0854	0.0813	0.0738	0.0717	0.0635	0.0667	0.0737	0.0744	0.0772	0.0860	0.086
3	48	0.0983	0.0938	0.0848	0.0825	0.0727	0.0764	0.0845	0.0855	0.0885	0.0990	0.099
4	40	0.1112	0.1061	0.0950	0.0925	0.0805	0.0849	0.0939	0.0958	0.0991	0.1120	0.112
5	40	0.1242	0.1191	0.1080	0.1054	0.0935	0.0979	0.1062	0.1088	0.1121	0.1250	0.125
6	32	0.1372	0.1312	0.1169	0.1141	0.0989	0.1042	0.1140	0.1177	0.1214	0.1380	0.138
8	32	0.1631	0.1571	0.1428	0.1399	0.1246	0.1302	0.1384	0.1437	0.1475	0.1640	0.164
10	24	0.1890	0.1818	0.1619	0.1586	0.1379	0.1449	0.1555	0.1629	0.1672	0.1900	0.190
12	24	0.2150	0.2078	0.1879	0.1845	0.1639	0.1709	0.1807	0.1889	0.1933	0.2160	0.216
1/4	20	0.2489	0.2408	0.2164	0.2127	0.1876	0.1959	0.2067	0.2175	0.2223	0.2500	0.250
5/16	18	0.3113	0.3026	0.2752	0.2712	0.2431	0.2524	0.2630	0.2764	0.2817	0.3125	0.3125
3/8	16	0.3737	0.3643	0.3331	0.3287	0.2970	0.3073	0.3182	0.3344	0.3401	0.3750	0.3750
7/16	14	0.4361	0.4258	0.3897	0.3850	0.3485	0.3602	0.3777	0.3911	0.3972	0.4375	0.4375
1/2	12	0.4985	0.4871	0.4444	0.4393	0.3963	0.4098	0.4223	0.4459	0.4525	0.5000	0.5000
1/2	13	0.4985	0.4876	0.4485	0.4435	0.4041	0.4167	0.4284	0.4500	0.4565	0.5000	0.5000
9/16	12	0.5609	0.5495	0.5068	0.5016	0.4587	0.4723	0.4843	0.5084	0.5152	0.5625	0.5625
5/8	11	0.6234	0.6113	0.5644	0.5589	0.5119	0.5266	0.5391	0.5660	0.5732	0.6250	0.6250
3/4	10	0.7482	0.7353	0.6832	0.6773	0.6255	0.6417	0.6545	0.6850	0.6927	0.7500	0.7500
7/8	9	0.8731	0.8592	0.8009	0.7946	0.7368	0.7547	0.7681	0.8028	0.8110	0.8750	0.8750
1	8	0.9980	0.9830	0.9168	0.9100	0.8446	0.8647	0.8797	0.9188	0.9276	1.0000	1.0000
1-1/8	7	1.1228	1.1064	1.0300	1.0228	0.9475	0.9704	0.9875	1.0322	1.0416	1.1250	1.1250
1-1/4	7	1.2478	1.2314	1.1550	1.1476	1.0725	1.0954	1.1125	1.1572	1.1668	1.2500	1.2500
1-3/8	6	1.3726	1.3544	1.2643	1.2563	1.1681	1.1946	1.2146	1.2667	1.2771	1.3750	1.3750
1-1/2	6	1.4976	1.4794	1.3893	1.3812	1.2931	1.3196	1.3396	1.3917	1.4022	1.5000	1.5000
1-3/4	5	1.7473	1.7268	1.6174	1.6085	1.5019	1.5335	1.5575	1.6201	1.6317	1.7500	1.7500
2	4-1/2	1.9971	1.9751	1.8528	1.8433	1.7245	1.7594	1.7861	1.8557	1.8681	2.0000	2.0000
2-1/4	4-1/2	2.2471	2.2251	2.1028	2.0931	1.9745	2.0094	2.0361	2.1057	2.1183	2.2500	2.2500
2-1/2	4	2.4969	2.4731	2.3345	2.3241	2.1902	2.2294	2.2594	2.3376	2.3511	2.5000	2.5000
2-3/4	4	2.7468	2.7230	2.5844	2.5739	2.4401	2.4794	2.5094	2.5876	2.6013	2.7500	2.7500
3	4	2.9968	2.9730	2.8344	2.8237	2.6901	2.7294	2.7594	2.8376	2.8515	3.0000	3.0000
3-1/4	4	3.2467	3.2229	3.0843	3.0734	2.9400	2.9794	3.0094	3.0876	3.1017	3.2500	3.2500
3-1/2	4	3.4967	3.4729	3.3343	3.3233	3.1900	3.2294	3.2594	3.3376	3.3519	3.5000	3.5000
3-3/4	4	3.7466	3.7228	3.5842	3.5730	3.4399	3.4794	3.5094	3.5876	3.6021	3.7500	3.7500
4	4	3.9966	3.9728	3.8342	3.8229	3.6899	3.7294	3.7594	3.8376	3.8523	4.0000	4.0000

1. Bold face type indicates unified threads.

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.

TABLE No. 4

Limiting Dimensions

Unified and American Standard COARSE THREAD Series—CLASS 3A and CLASS 3B FITS

DIMENSIONS IN INCHES

Sizes	Threads Per Inch	SCREW SIZES—CLASS 3A FIT					NUT SIZES—CLASS 3B FIT					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
1/4	20	0.2500	0.2419	0.2175	0.2147	0.1887	0.1959	0.2067	0.2175	0.2211	0.2500	0.2500
5/16	18	0.3125	0.3038	0.2764	0.2734	0.2443	0.2524	0.2630	0.2764	0.2803	0.3125	0.3125
3/8	16	0.3750	0.3656	0.3344	0.3311	0.2983	0.3073	0.3182	0.3344	0.3387	0.3750	0.3750
7/16	14	0.4375	0.4272	0.3911	0.3876	0.3499	0.3602	0.3717	0.3911	0.3957	0.4375	0.4375
1/2	13	0.5000	0.4891	0.4500	0.4463	0.4056	0.4167	0.4284	0.4500	0.4548	0.5000	0.5000
1/2	12	0.5000	0.4886	0.4459	0.4421	0.3978	0.4098	0.4223	0.4459	0.4509	0.5000	0.5000
9/16	12	0.5625	0.5511	0.5084	0.5045	0.4603	0.4723	0.4843	0.5084	0.5135	0.5625	0.5625
5/8	11	0.6250	0.6129	0.5660	0.5619	0.5135	0.5266	0.5391	0.5660	0.5714	0.6250	0.6250
3/4	10	0.7500	0.7371	0.6850	0.6806	0.6273	0.6417	0.6545	0.6850	0.6907	0.7500	0.7500
7/8	9	0.8750	0.8611	0.8028	0.7981	0.7387	0.7547	0.7681	0.8028	0.8089	0.8750	0.8750
1	8	1.0000	0.9850	0.9188	0.9137	0.8466	0.8647	0.8797	0.9188	0.9254	1.0000	1.0000
1-1/8	7	1.1250	1.1086	1.0322	1.0268	0.9497	0.9704	0.9875	1.0322	1.0393	1.1250	1.1250
1-1/4	7	1.2500	1.2336	1.1572	1.1517	1.0747	1.0954	1.1125	1.1572	1.1644	1.2500	1.2500
1-3/8	6	1.3750	1.3568	1.2667	1.2607	1.1705	1.1946	1.2146	1.2667	1.2745	1.3750	1.3750
1-1/2	6	1.5000	1.4818	1.3917	1.3856	1.2955	1.3196	1.3396	1.3917	1.3996	1.5000	1.5000
1-3/4	5	1.7500	1.7295	1.6201	1.6134	1.5046	1.5335	1.5575	1.6201	1.6288	1.7500	1.7500
2	4-1/2	2.0000	1.9780	1.8557	1.8486	1.7274	1.7594	1.7861	1.8557	1.8650	2.0000	2.0000
2-1/4	4-1/2	2.2500	2.2280	2.1057	2.0984	1.9774	2.0094	2.0361	2.1057	2.1152	2.2500	2.2500
2-1/2	4	2.5000	2.4762	2.3376	2.3298	2.1933	2.2294	2.2594	2.3376	2.3477	2.5000	2.5000
2-3/4	4	2.7500	2.7262	2.5876	2.5797	2.4433	2.4794	2.5094	2.5876	2.5979	2.7500	2.7500
3	4	3.0000	2.9762	2.8376	2.8296	2.6933	2.7294	2.7594	2.8376	2.8480	3.0000	3.0000
3-1/4	4	3.2500	3.2262	3.0876	3.0794	2.9433	2.9794	3.0094	3.0876	3.0982	3.2500	3.2500
3-1/2	4	3.5000	3.4762	3.3376	3.3293	3.1933	3.2294	3.2594	3.3376	3.3484	3.5000	3.5000
3-3/4	4	3.7500	3.7262	3.5876	3.5792	3.4433	3.4794	3.5094	3.5876	3.5985	3.7500	3.7500
4	4	4.0000	3.9762	3.8376	3.8291	3.6933	3.7294	3.7594	3.8376	3.8487	4.0000	4.0000

1. Bold face type indicates unified threads.

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.



TABLE No. 5
Limiting Dimensions

American National FINE THREAD Series—CLASS 2, FREE FIT

DIMENSIONS IN INCHES

Sizes	Threads Per Inch	Screw Sizes					Nut Sizes					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
0	80	0.0600	0.0566	0.0519	0.0502	0.0447	0.0465	0.0514	0.0519	0.0536	0.0600	0.060
1	72	0.0730	0.0694	0.0640	0.0622	0.0560	0.0580	0.0634	0.0640	0.0658	0.0730	0.073
2	64	0.0860	0.0822	0.0759	0.0740	0.0668	0.0691	0.0746	0.0759	0.0778	0.0860	0.086
3	56	0.0990	0.0950	0.0874	0.0854	0.0771	0.0797	0.0856	0.0874	0.0894	0.0990	0.099
4	48	0.1120	0.1076	0.0985	0.0963	0.0864	0.0894	0.0960	0.0985	0.1007	0.1120	0.112
5	44	0.1250	0.1204	0.1102	0.1079	0.0971	0.1004	0.1068	0.1102	0.1125	0.1250	0.125
6	40	0.1380	0.1332	0.1218	0.1194	0.1073	0.1109	0.1179	0.1218	0.1242	0.1380	0.138
8	36	0.1640	0.1590	0.1460	0.1435	0.1299	0.1339	0.1402	0.1460	0.1485	0.1640	0.164
10	32	0.1900	0.1846	0.1697	0.1670	0.1517	0.1562	0.1624	0.1697	0.1724	0.1900	0.190
12	28	0.2160	0.2098	0.1928	0.1897	0.1722	0.1773	0.1835	0.1928	0.1959	0.2160	0.216
1/4	28	0.2500	0.2438	0.2268	0.2237	0.2062	0.2113	0.2173	0.2268	0.2299	0.2500	0.2500
5/16	24	0.3125	0.3059	0.2854	0.2821	0.2614	0.2674	0.2739	0.2854	0.2887	0.3125	0.3125
3/8	24	0.3750	0.3684	0.3479	0.3446	0.3239	0.3299	0.3364	0.3479	0.3512	0.3750	0.3750
7/16	20	0.4375	0.4303	0.4050	0.4014	0.3762	0.3834	0.3906	0.4050	0.4086	0.4375	0.4375
1/2	20	0.5000	0.4928	0.4675	0.4639	0.4387	0.4459	0.4531	0.4675	0.4711	0.5000	0.5000
9/16	18	0.5625	0.5543	0.5264	0.5223	0.4943	0.5024	0.5100	0.5264	0.5305	0.5625	0.5625
5/8	18	0.6250	0.6168	0.5889	0.5848	0.5568	0.5649	0.5725	0.5889	0.5930	0.6250	0.6250
3/4	16	0.7500	0.7410	0.7094	0.7049	0.6733	0.6823	0.6903	0.7094	0.7139	0.7500	0.7500
7/8	14	0.8750	0.8652	0.8286	0.8237	0.7874	0.7977	0.8062	0.8286	0.8335	0.8750	0.8750
1	14	1.0000	0.9902	0.9536	0.9487	0.9124	0.9227	0.9312	0.9536	0.9585	1.0000	1.0000
1-1/8	12	1.1250	1.1138	1.0709	1.0653	1.0228	1.0348	1.0438	1.0709	1.0765	1.1250	1.1250
1-1/4	12	1.2500	1.2388	1.1959	1.1903	1.1478	1.1598	1.1688	1.1959	1.2015	1.2500	1.2500
1-3/8	12	1.3750	1.3638	1.3209	1.3153	1.2728	1.2848	1.2938	1.3209	1.3265	1.3750	1.3750
1-1/2	12	1.5000	1.4888	1.4459	1.4403	1.3978	1.4098	1.4188	1.4459	1.4515	1.5000	1.5000

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.

TABLE No. 6
Limiting Dimensions
 American National FINE THREAD Series—CLASS 3, MEDIUM FIT
 DIMENSIONS IN INCHES

Sizes	Threads Per Inch	Screw Sizes					Nut Sizes					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
0	80	0.0600	0.0566	0.0519	0.0506	0.0447	0.0465	0.0514	0.0519	0.0532	0.0600	0.060
1	72	0.0730	0.0694	0.0640	0.0627	0.0560	0.0580	0.0634	0.0640	0.0653	0.0730	0.073
2	64	0.0860	0.0822	0.0759	0.0745	0.0668	0.0691	0.0746	0.0759	0.0773	0.0860	0.086
3	56	0.0990	0.0950	0.0874	0.0859	0.0771	0.0797	0.0856	0.0874	0.0889	0.0990	0.099
4	48	0.1120	0.1076	0.0985	0.0969	0.0864	0.0894	0.0960	0.0985	0.1001	0.1120	0.112
5	44	0.1250	0.1204	0.1102	0.1086	0.0971	0.1004	0.1068	0.1102	0.1118	0.1250	0.125
6	40	0.1380	0.1332	0.1218	0.1201	0.1073	0.1109	0.1179	0.1218	0.1235	0.1380	0.138
8	36	0.1640	0.1590	0.1460	0.1442	0.1299	0.1339	0.1402	0.1460	0.1478	0.1640	0.164
10	32	0.1900	0.1846	0.1697	0.1678	0.1517	0.1562	0.1624	0.1697	0.1716	0.1900	0.190
12	28	0.2160	0.2098	0.1928	0.1906	0.1722	0.1773	0.1835	0.1928	0.1950	0.2160	0.216
1/4	28	0.2500	0.2438	0.2268	0.2246	0.2062	0.2113	0.2173	0.2268	0.2290	0.2500	0.2500
5/16	24	0.3125	0.3059	0.2854	0.2830	0.2614	0.2674	0.2739	0.2854	0.2878	0.3125	0.3125
3/8	24	0.3750	0.3684	0.3479	0.3455	0.3239	0.3299	0.3364	0.3479	0.3503	0.3750	0.3750
7/16	20	0.4375	0.4303	0.4050	0.4024	0.3762	0.3834	0.3906	0.4050	0.4076	0.4375	0.4375
1/2	20	0.5000	0.4928	0.4675	0.4649	0.4387	0.4459	0.4531	0.4675	0.4701	0.5000	0.5000
9/16	18	0.5625	0.5543	0.5264	0.5234	0.4943	0.5024	0.5100	0.5264	0.5294	0.5625	0.5625
5/8	18	0.6250	0.6168	0.5889	0.5859	0.5568	0.5649	0.5725	0.5889	0.5919	0.6250	0.6250
3/4	16	0.7500	0.7410	0.7094	0.7062	0.6733	0.6823	0.6903	0.7094	0.7126	0.7500	0.7500
7/8	14	0.8750	0.8652	0.8286	0.8250	0.7874	0.7977	0.8062	0.8286	0.8322	0.8750	0.8750
1	14	1.0000	0.9902	0.9536	0.9500	0.9124	0.9227	0.9312	0.9536	0.9572	1.0000	1.0000
1-1/8	12	1.1250	1.1138	1.0709	1.0669	1.0228	1.0348	1.0438	1.0709	1.0749	1.1250	1.1250
1-1/4	12	1.2500	1.2388	1.1959	1.1919	1.1478	1.1598	1.1688	1.1959	1.1999	1.2500	1.2500
1-3/8	12	1.3750	1.3638	1.3209	1.3169	1.2728	1.2848	1.2938	1.3209	1.3249	1.3750	1.3750
1-1/2	12	1.5000	1.4888	1.4459	1.4419	1.3978	1.4098	1.4188	1.4459	1.4499	1.5000	1.5000

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.

TABLE No. 7

Limiting Dimensions

Unified and American Standard FINE THREAD Series—CLASS 2A and CLASS 2B FITS

DIMENSIONS IN INCHES

Sizes	Threads Per Inch	SCREW SIZES—CLASS 2A FIT					NUT SIZES—CLASS 2B FIT					Basic Major Diam- eter
		Major Diameter		Pitch Diameter		Minor Diam- eter Maxi- mum*	Minor Diameter		Pitch Diameter		Major Diam- eter Mini- mum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
0	80	0.0595	0.0563	0.0514	0.0496	0.0442	0.0465	0.0514	0.0519	0.0542	0.0600	0.060
1	72	0.0724	0.0689	0.0634	0.0615	0.0554	0.0580	0.0635	0.0640	0.0665	0.0730	0.073
2	64	0.0854	0.0816	0.0753	0.0733	0.0662	0.0691	0.0753	0.0759	0.0785	0.0860	0.086
3	56	0.0983	0.0942	0.0867	0.0845	0.0764	0.0797	0.0865	0.0874	0.0902	0.0990	0.099
4	48	0.1113	0.1068	0.0978	0.0954	0.0857	0.0894	0.0968	0.0985	0.1016	0.1120	0.112
5	44	0.1243	0.1195	0.1095	0.1070	0.0964	0.1004	0.1079	0.1102	0.1134	0.1250	0.125
6	40	0.1372	0.1321	0.1210	0.1184	0.1065	0.1109	0.1186	0.1218	0.1252	0.1380	0.138
8	36	0.1632	0.1577	0.1452	0.1424	0.1291	0.1339	0.1416	0.1460	0.1496	0.1640	0.164
10	32	0.1891	0.1831	0.1688	0.1658	0.1508	0.1562	0.1641	0.1697	0.1736	0.1900	0.190
12	28	0.2150	0.2085	0.1918	0.1886	0.1712	0.1773	0.1857	0.1928	0.1970	0.2160	0.216
1/4	28	0.2490	0.2425	0.2258	0.2225	0.2052	0.2113	0.2190	0.2268	0.2311	0.2500	0.2500
5/16	24	0.3114	0.3042	0.2843	0.2806	0.2603	0.2674	0.2754	0.2854	0.2902	0.3125	0.3125
3/8	24	0.3739	0.3667	0.3468	0.3430	0.3228	0.3299	0.3372	0.3479	0.3528	0.3750	0.3750
7/16	20	0.4362	0.4281	0.4037	0.3995	0.3749	0.3834	0.3916	0.4050	0.4104	0.4375	0.4375
1/2	20	0.4987	0.4906	0.4662	0.4619	0.4374	0.4459	0.4537	0.4675	0.4731	0.5000	0.5000
9/16	18	0.5611	0.5524	0.5250	0.5205	0.4929	0.5024	0.5106	0.5264	0.5323	0.5625	0.5625
5/8	18	0.6236	0.6149	0.5875	0.5828	0.5554	0.5649	0.5730	0.5889	0.5949	0.6250	0.6250
3/4	16	0.7485	0.7391	0.7079	0.7029	0.6718	0.6823	0.6908	0.7094	0.7159	0.7500	0.7500
7/8	14	0.8734	0.8631	0.8270	0.8216	0.7858	0.7977	0.8068	0.8286	0.8356	0.8750	0.8750
1	12	0.9982	0.9868	0.9441	0.9382	0.8960	0.9098	0.9198	0.9459	0.9535	1.0000	1.0000
1-1/8	12	1.1232	1.1118	1.0691	1.0631	1.0210	1.0348	1.0448	1.0709	1.0787	1.1250	1.1250
1-1/4	12	1.2482	1.2368	1.1941	1.1879	1.1460	1.1598	1.1698	1.1959	1.2039	1.2500	1.2500
1-3/8	12	1.3731	1.3617	1.3190	1.3127	1.2709	1.2848	1.2948	1.3209	1.3291	1.3750	1.3750
1-1/2	12	1.4981	1.4867	1.4440	1.4376	1.3959	1.4098	1.4198	1.4459	1.4542	1.5000	1.5000

1. Bold face type indicates unified threads.

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.



TABLE No. 8
Limiting Dimensions
Unified FINE THREAD Series—CLASS 3A and CLASS 3B FITS
DIMENSIONS IN INCHES

Sizes	Threads Per Inch	SCREW SIZES—CLASS 3A FIT					NUT SIZES—CLASS 3B FIT					Basic Major Diameter
		Major Diameter		Pitch Diameter		Minor Diameter Maximum*	Minor Diameter		Pitch Diameter		Major Diameter Minimum†	
		Max.	Min.	Max.	Min.		Min.	Max.	Min.	Max.		
1	2	3	4	5	6	7	8	9	10	11	12	13
1/4	28	0.2500	0.2435	0.2268	0.2243	0.2062	0.2113	0.2190	0.2268	0.2300	0.2500	0.2500
5/16	24	0.3125	0.3053	0.2854	0.2827	0.2614	0.2674	0.2754	0.2854	0.2890	0.3125	0.3125
3/8	24	0.3750	0.3678	0.3479	0.3450	0.3239	0.3299	0.3472	0.3479	0.3516	0.3750	0.3750
7/16	20	0.4375	0.4294	0.4050	0.4019	0.3762	0.3834	0.3916	0.4050	0.4091	0.4375	0.4375
1/2	20	0.5000	0.4919	0.4675	0.4643	0.4387	0.4459	0.4537	0.4675	0.4717	0.5000	0.5000
9/16	18	0.5625	0.5538	0.5264	0.5230	0.4943	0.5024	0.5106	0.5264	0.5308	0.5625	0.5625
5/8	18	0.6250	0.6163	0.5889	0.5854	0.5568	0.5649	0.5730	0.5889	0.5934	0.6250	0.6250
3/4	16	0.7500	0.7406	0.7094	0.7056	0.6733	0.6823	0.6908	0.7094	0.7143	0.7500	0.7500
7/8	14	0.8750	0.8647	0.8286	0.8245	0.7874	0.7977	0.8068	0.8286	0.8339	0.8750	0.8750
1	12	1.0000	0.9886	0.9459	0.9415	0.8978	0.9098	0.9198	0.9459	0.9516	1.0000	1.0000
1-1/8	12	1.1250	1.1136	1.0709	1.0664	1.0228	1.0348	1.0448	1.0709	1.0768	1.1250	1.1250
1-1/4	12	1.2500	1.2386	1.1959	1.1913	1.1478	1.1598	1.1698	1.1959	1.2019	1.2500	1.2500
1-3/8	12	1.3750	1.3636	1.3209	1.3162	1.2728	1.2848	1.2948	1.3209	1.3270	1.3750	1.3750
1-1/2	12	1.5000	1.4886	1.4459	1.4411	1.3978	1.4098	1.4198	1.4459	1.4522	1.5000	1.5000

* Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. In dimensioning external threads, the minimum minor diameter is not specified, being established by the crest of an unworn tool. In practice, the minor diameter of an external thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the internal thread.

† Dimensions for the minimum major diameter of the nut correspond to the basic flat ($1/8 \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. In dimensioning internal threads the maximum major diameter is not specified, being established by the crest of an unworn tool. In practice, the major diameter of an internal thread is satisfactory when accepted by a gage or gaging method that represents the maximum metal condition of the external thread.

TABLE No. 9

American Standard Threads—Class 2 and Class 3 Fits

Thread sizes and fits listed below are those presently considered standard by Alcoa for Screw Machine Products and Fasteners, and for which there will be no charge for tools and thread gages. All threads are American Standard Thread form, and tolerances are in accordance with American Standard B1.1-1949.

DIMENSIONS IN INCHES

Size		American Standard Coarse Thread		American Standard Fine Thread		American Standard Extra Fine Thread	
Fraction	Decimal	No. 2 Fit	No. 3 Fit	No. 2 Fit	No. 3 Fit	No. 2 Fit	No. 3 Fit
2	.086	2-56	2-56	2-64	2-64		
3	.099	3-48	3-48	3-56	3-56		
4	.112	4-40	4-40	4-48			
5	.125	5-40	5-40	5-44	5-44		
6	.138	6-32	6-32	6-40	6-40		
8	.164	8-32	8-32	8-36	8-36		
10	.190	10-24	10-24	10-32	10-32		
12	.216	12-24	12-24	12-28	12-28		
1/4	.250	1/4-20	1/4-20	1/4-28	1/4-28	1/4-32	
5/16	.3125	5/16-18	5/16-18	5/16-24	5/16-24	5/16-32	5/16-32
3/8	.375	3/8-16	3/8-16	3/8-24	3/8-24		
7/16	.4375	7/16-14	7/16-14	7/16-20	7/16-20	7/16-28	7/16-28
1/2	.500	1/2-13	1/2-13	1/2-20	1/2-20	1/2-28	1/2-28
9/16	.5625	9/16-12	9/16-12	9/16-18	9/16-18		
5/8	.625	5/8-11	5/8-11	5/8-18	5/8-18	5/8-24	5/8-24
11/16	.6875	....	....	....	....	11/16-24	11/16-24
3/4	.750	3/4-10	3/4-10	3/4-16	3/4-16	3/4-20	3/4-20
7/8	.875	7/8-9	7/8-9	7/8-14	7/8-14	7/8-20	7/8-20
1	1.000	1-8	1-8	1-14	1-14	1-20	1-20
1-1/16	1.0625	....	....	....	....	1-1/16-18	1-1/16-18
1-1/8	1.125	....	....	1-1/8-12	1-1/8-12		
1-3/16	1.1875	....	....	....	....	1-3/16-18	1-3/16-18
1-1/4	1.250	....	....	1-1/4-12	1-1/4-12	1-1/4-18	1-1/4-18
1-3/8	....	....	....	....	....	....	....
1-7/16	....	....	....	....	....	1-7/16-18	1-7/16-18
1-1/2	....	....	....	....	....	1-1/2-18	1-1/2-18

TABLE No. 10

American National Taper Pipe Threads

DIMENSIONS IN INCHES

Nominal Pipe Size	Actual O.D. of Pipe	Threads Per Inch	Nominal Pipe Size	Actual O.D. of Pipe	Threads Per Inch
1/8	.405	27	3/4	1.050	14
1/4	.540	18	1	1.315	11-1/2
3/8	.675	18	1-1/4	1.660	11-1/2
1/2	.840	14	1-1/2	1.900	11-1/2



TABLE No. 11

Unified Threads—Class 2A—2B and 3A—3B Fits

Thread sizes and fits listed below are those which will be adopted as standard by Alcoa at such time as these new tolerance classes are accepted generally by the industry. There will be no charge for tools and thread gages to produce parts with the threads listed. However, it is presently impossible to determine when such tools and gages will be available.

UNIFIED COARSE THREAD		UNIFIED FINE THREAD	
Class 2A External Class 2B Internal		Class 3A External Class 3B Internal	
2—56	5/16—18		9/16—18
3—48	3/8—16	1/4—28	5/8—18
4—40	1/2—12	5/16—24	3/4—16
5—40	1/2—13	3/8—24	
6—32			
8—32	5/8—11	7/16—20	7/8—14
10—24	3/4—10	1/2—20	1—12
12—24	7/8—9		
1/4—20	1—8		

TABLE No. 12

Minimum Thread Lengths for Bolts

DIMENSIONS IN INCHES

Bolt Length	No. 10, 1/4	5/16, 3/8	7/16, 1/2	9/16, 5/8	3/4	7/8	1
3/4	1/2	1/2					
1	3/4	3/4	3/4	3/4	1		
1-1/4	3/4	3/4	1	1	1-1/8	1-1/8	
1-1/2	3/4	7/8	1	1-1/8	1-3/8	1-3/8	1-3/8
1-3/4	3/4	7/8	1	1-3/16			
2	3/4	1	1-1/4	1-1/4	1-3/8	1-9/16	1-5/8
2-1/2	3/4	1	1-1/4	1-1/2	1-1/2	1-9/16	1-3/4
3	7/8	1	1-1/4	1-1/2	1-3/4	1-3/4	1-3/4
4	7/8	1	1-1/4	1-1/2	1-3/4	2	2-1/4
5	7/8	1-3/16	1-1/4	1-1/2	1-3/4	2	2-1/4
6	7/8	1-3/16	1-1/2	1-1/2	1-3/4	2	2-1/4
8	7/8	1-3/16	1-1/2	1-13/16	2	2	2-1/4
10	7/8	1-3/16	1-1/2	1-13/16	2-1/8	2-7/16	2-1/2

1. Minimum thread length is measured from the end of the bolt to the last complete thread.
2. For bolts too short for the specified minimum thread lengths, threads shall be cut or rolled to within 1/4 inch of head or neck on sizes up to and including 1/2 inch; 3/8 inch on sizes 9/16 to 1 inch, inclusive.
3. Length of incomplete thread shall not exceed 2-1/2 threads.
4. Bolt length is measured from the greatest diameter of the under surface of the head to the end of the bolt.
5. For intermediate bolt lengths, the minimum thread length shall be the same as that specified in the table for the next shorter length of bolt of the same diameter.
6. Bolts with special thread lengths may be made to order.



TABLE No. 13

Tap Drill Sizes with Corresponding Percentage Depth of Thread

Recommended Maximum Depths of Tapped Holes

Recommended Minimum Clearance at Bottom of Blind Tapped Holes

DIMENSIONS IN INCHES

Thread Size	Threads Per Inch	Stock Drills		Per Cent Depth of Basic Thread	Recommended Maximum Depth of Tapped Hole (Usable Thread)	Recommended Minimum Clearance at Bottom of Tapped Blind Hole
		Nominal Size	Decimal Diameter			
2	56 NC	No. 51	.0670	82	11/64	5/32
		No. 50	.0700	69		
		No. 49	.0730	56		
3	48 NC	5/64 in.	.0781	77	13/64	5/32
		No. 46	.0810	67		
		2.10mm.	.0827	60		
	56 NF	No. 46	.0810	78	13/64	5/32
		2.10mm.	.0827	70		
		No. 44	.0860	56		
4	40 NC	No. 44	.0860	80	7/32	5/32
		No. 43	.0890	71		
		2.30mm.	.0906	66		
		3/32 in.	.0937	56		
	48 NF	2.30mm.	.0906	79	7/32	5/32
		3/32 in.	.0937	68		
5	40 NC	No. 41	.0960	59	3/8	5/32
		No. 39	.0995	79		
		No. 38	.1015	72		
		2.60mm.	.1024	70		
		No. 37	.1040	65		
	44 NF	2.60mm.	.1024	77	3/8	5/32
		No. 37	.1040	71		
		No. 36	.1065	63		
6	32 NC	No. 36	.1065	78	13/32	5/32
		7/64 in.	.1094	70		
		No. 33	.1130	62		
	40 NF	No. 33	.1130	77	13/32	5/32
		No. 32	.1160	68		
		No. 31	.1200	55		
8	32 NC	No. 36	.1065	78	1/2	5/32
		7/64 in.	.1094	70		
		No. 33	.1130	62		
	36 NF	3.40mm.	.1339	74	1/2	5/32
		No. 29	.1360	69		
		3.50mm.	.1378	65		
		No. 28	.1405	58		
10	24 NC	3.40mm.	.1339	83	9/16	13/64
		No. 29	.1360	78		
		3.50mm.	.1378	73		
		9/64 in.	.1406	65		
		No. 27	.1440	55		
		No. 26	.1470	79		
		No. 25	.1495	75		
		No. 24	.1520	70		
		No. 23	.1540	66		
		No. 22	.1570	61		
		No. 21	.1590	57		

NOTE—See footnotes at bottom of page 232.

(Continued on Next Page)



TABLE No. 13—Continued

Tap Drill Sizes with Corresponding Percentage Depth of Thread
Recommended Maximum Depths of Tapped Holes
Recommended Minimum Clearance at Bottom of Blind Tapped Holes

DIMENSIONS IN INCHES

Thread Size	Threads Per Inch	Stock Drills		Per Cent Depth of Basic Thread	Recommended Maximum Depth of Tapped Hole (Usable Thread)	Recommended Minimum Clearance at Bottom of Tapped Blind Hole
		Nominal Size	Decimal Diameter			
10	32 NF	5/32 in.	.1562	83	9/16	5/32
		No. 21	.1590	76		
		No. 20	.1610	71		
		No. 19	.1660	59		
12	24 NC	11/64 in.	.1719	82	21/32	13/64
		No. 17	.1730	79		
		No. 16	.1770	72		
		No. 15	.1800	67		
		No. 14	.1820	63		
	28 NF	No. 15	.1800	78	21/32	11/64
		No. 13	.1850	67		
		3/16 in.	.1875	61		
1/4	20 NC	No. 12	.1890	58	3/4	1/4
		No. 8	.1990	79		
		13/64 in.	.2031	72		
		No. 5	.2055	67		
	28 NF	No. 3	.2130	80	3/4	11/64
		5.5mm.	.2165	72		
		7/32 in.	.2187	67		
		No. 2	.2210	62		
	32 NEF	7/32 in.	.2188	77	3/4	5/32
		5.6mm.	.2205	73		
		5.7mm.	.2244	63		
5/16	18 NC	F	.2570	77	15/16	9/32
		G	.2610	71		
		17/64 in.	.2656	65		
	24 NF	I	.2720	75	15/16	13/64
		J	.2770	66		
	32 NEF	K	.2810	77	15/16	5/32
		7.2mm.	.2835	71		
		7.3mm.	.2874	62		
	16 NC	5/16 in.	.3125	77	1-1/8	5/16
		O	.3160	73		
		P	.2320	64		
	24 NF	Q	.3320	79	1-1/8	13/64
		8.5mm.	.3346	74		
		R	.3390	67		
	32 NEF	11/32 in.	.3438	77	1-1/8	5/32
		8.75mm.	.3445	75		
		8.8mm.	.3465	70		
7/16	14 NC	U	.3680	75	1-5/16	23/64
		3/8 in.	.3750	67		
	20 NF	W	.3860	79	1-5/16	1/4
		25/64 in.	.3906	72		
		X	.3970	62		
	28 NEF	Y	.4040	72	1-5/16	11/64
		13/32 in.	.4062	68		

NOTE—See footnotes at bottom of page 232.

(Continued on Next Page)



TABLE No. 13—Continued

Tap Drill Sizes with Corresponding Percentage Depth of Thread Recommended Maximum Depths of Tapped Holes Recommended Minimum Clearance at Bottom of Blind Tapped Holes

DIMENSIONS IN INCHES

Thread Size	Threads Per Inch	Stock Drills		Per Cent Depth of Basic Thread	Recommended Maximum Depth of Tapped Hole (Usable Thread)	Recommended Minimum Clearance at Bottom of Tapped Blind Hole
		Nominal Size	Decimal Diameter			
7/16	13 NC	27/64 in. 7/16 in.	.4219 .4375	78 62	1-1/2	3/8
	20 NF	29/64 in. 11.75mm.	.4531 .4626	72 57		1/4
	28 NEF	15/32 in.	.4687	67		11/64
9/16	12 NC	31/64 in. 1/2 in.	.4844 .500	72 58	.....	27/64
	18 NF	13.0mm. 33/64 in.	.5118 .5156	70 65		9/32
	24 NEF	17/32 in.	.5312	58		13/64
5/8	11 NC	17/32 in. 35/64 in.	.5312 .5469	79 66	.....	29/64
	18 NF	14.5mm. 37/64	.5709 .5781	75 65		9/32
	24 NEF	15mm.	.5906	64		13/64
11/16	24 NEF	41/64 in. 16.5mm.	.6406 .6496	87 70	.....	13/64
3/4	10 NC	16.5mm. 21/32 in. 17.0mm.	.6496 .6562 .6693	77 72 62	.....	1/2
	16 NF	11/16 in. 17.5mm. 45/64 in.	.6875 .6890 .7031	77 75 58		5/16
	20 NEF	45/64 in. 18.0mm.	.7031 .7087	72 64		1/4
13/16	20 NEF	49/64 in.	.7656	72	.....	1/4
7/8	9 NC	49/64 in. 19.5mm. 25/32 in.	.7656 .7677 .7812	76 74 65	.....	9/16
	14 NF	51/64 in. 20.5mm. 13/16 in.	.7969 .8071 .8125	84 73 67		23/64
	20 NEF	21.0mm.	.8268	74		1/4
15/16	20 NEF	22.5mm.	.8858	80	.....	1/4
1	8 NC	22.0mm. 7/8 in. 57/64 in.	.8661 .8750 .8906	82 77 67	.....	5/8
	14 NF	23.5mm. 15/16 in.	.9252 .9375	81 67		23/64
	20 NEF	24.0mm. 61/64 in.	.9449 .9531	85 72		1/4

NOTE—See footnotes at bottom of page 232.

(Concluded on Next Page)



TABLE No. 13—Concluded

Tap Drill Sizes with Corresponding Percentage Depth of Thread **Recommended Maximum Depths of Tapped Holes** **Recommended Minimum Clearance at Bottom of Blind Tapped Holes**

DIMENSIONS IN INCHES

Thread Size	Threads Per Inch	Stock Drills		Per Cent Depth of Basic Thread	Recommended Maximum Depth of Tapped Hole (Usable Thread)	Recommended Minimum Clearance at Bottom of Tapped Blind Hole
		Nominal Size	Decimal Diameter			
1-1/16	18 NEF	25.5mm.	1.0040	81	9/32
1-1/8	7 NC	25.0mm.	.9842	76	23/32
		63/64 in.	.9844	76	.....
		1 in.	1.000	67	.....
	12 NF	26.5mm.	1.0433	75	27/64
		1-3/64 in.	1.0468	72	.....
	18 NEF	27.0mm.	1.0630	86	9/32
		1-5/64 in.	1.0781	65	.....
1-3/16	18 NEF	1-1/8 in.	1.1250	87	9/32
		1-9/64 in.	1.1406	65	.....
1-1/4	7 NC	28.0mm.	1.1024	80	23/32
		1-7/64 in.	1.1094	76	.....
		1-1/8 in.	1.1250	67	.....
	12 NF	29.5mm.	1.1614	82	27/64
		1-11/64 in.	1.1719	72	.....
	18 NEF	1-3/16 in.	1.1875	87	9/32
		30.5mm.	1.2008	68	.....
1-5/16	18 NEF	32.0mm.	1.2598	73	9/32
1-3/8	6 NC	30.5mm.	1.2008	80	53/64
		1-13/64 in.	1.2031	79	.....
		1-7/32 in.	1.2188	72	.....
	12 NF	1-9/32 in.	1.2812	87	27/64
		1-19/64 in.	1.2969	72	.....
	18 NEF	33.5mm.	1.3189	78	9/32
		1-21/64 in.	1.3281	65	.....
1-7/16	18 NEF	35mm.	1.3780	82	9/32
		1-25/64 in.	1.3906	65	.....
1-1/2	6 NC	1-21/64 in.	1.3281	79	53/64
		1-11/32 in.	1.3438	72	.....
	12 NF	36mm.	1.4173	76	27/64
		1-27/64 in.	1.4219	72	.....
	18 NEF	1-7/16 in.	1.4375	87	9/32
		1-29/64 in.	1.4531	65	.....

- 1 Stock drills listed do not all fall between the maximum and minimum values for the minor diameter of the nut. However, these values are frequently disregarded in practice—especially when tapping deep holes.
- 2 Maximum recommended depth of tapped holes is given opposite the largest drill for each thread size since the greatest depth is obtained most economically by using the largest possible drill. This value will vary considerably with the material being tapped; figures given are for the more readily machinable aluminum alloys. Holes deeper than the recommended values may be tapped if necessary, but usually at increased cost. Reducing the depth of thread form by the use of a larger tap drill will minimize the additional cost.
- 3 Maximum depth of tapped hole for threads over 1/2" diameter is usually governed by factors other than the strength of the tap and ability to clear out chips, which are the limitations for the smaller sizes. It is therefore impossible to list maximum depths for the larger sizes.
- 4 The recommended minimum clearance values at the bottom of blind tapped holes are for most economical manufacture. Threads may be tapped closer to the bottom at increased cost in most cases.



TABLE No. 14

Decimal Sizes of Drills and Length of Drill Points

DIMENSIONS IN INCHES

Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point
80	.0135	.004	1.7 mm.	.0669	.020	3.5 mm.	.1378	.041	5.2 mm.	.2047	.062
79	.0145	.004	51	.0670	.020	28	.1405	.042	5	.2055	.062
1/64	.0156	.005	50	.0700	.021	9/64	.1406	.042	5.3 mm.	.2087	.063
78	.0160	.005	1.8 mm.	.0709	.021	3.6 mm.	.1417	.042	4	.2090	.063
77	.0180	.005	49	.0730	.022	27	.1440	.043	5.4 mm.	.2126	.064
.5 mm.	.0197	.006	1.9 mm.	.0748	.023	3.7 mm.	.1457	.044	3	.2130	.064
76	.0200	.006	48	.0760	.023	26	.1470	.044	5.5 mm.	.2165	.065
75	.0210	.006	5/64	.0781	.024	25	.1495	.045	7/32	.2187	.066
74	.0225	.007	47	.0785	.024	3.8 mm.	.1496	.045	5.6 mm.	.2205	.066
.6 mm.	.0236	.007	2. mm.	.0787	.024	24	.1520	.046	2	.2210	.066
73	.0240	.007	46	.0810	.024	3.9 mm.	.1535	.046	5.7 mm.	.2244	.067
72	.0250	.008	45	.0820	.025	23	.1540	.046	1	.2280	.068
71	.0260	.008	2.1 mm.	.0827	.025	5/32	.1562	.047	5.8 mm.	.2283	.069
.7 mm.	.0276	.008	44	.0860	.026	22	.1570	.047	5.9 mm.	.2323	.070
70	.0280	.008	2.2 mm.	.0866	.026	4. mm.	.1575	.047	A	.2340	.070
69	.0292	.009	43	.0890	.027	21	.1590	.048	15/64	.2344	.070
68	.0310	.009	2.3 mm.	.0905	.027	20	.1610	.048	6. mm.	.2362	.071
1/32	.0313	.009	42	.0935	.028	4.1 mm.	.1614	.048	B	.2380	.071
.8 mm.	.0315	.010	3/32	.0937	.028	4.2 mm.	.1654	.050	6.1 mm.	.2401	.072
67	.0320	.010	2.4 mm.	.0945	.028	19	.1660	.050	C	.2420	.073
66	.0330	.010	41	.0960	.029	4.3 mm.	.1693	.051	6.2 mm.	.2441	.073
65	.0350	.011	40	.0980	.029	18	.1695	.051	D	.2460	.074
.9 mm.	.0354	.011	2.5 mm.	.0984	.029	11/64	.1719	.052	6.3 mm.	.2480	.075
64	.0360	.011	39	.0995	.029	17	.1730	.052	E	.2500	.075
63	.0370	.011	38	.1015	.030	4.4 mm.	.1732	.052	1/4	.2500	.075
62	.0380	.011	2.6 mm.	.1024	.031	16	.1770	.053	6.4 mm.	.2520	.076
61	.0390	.012	37	.1040	.031	4.5 mm.	.1771	.053	6.5 mm.	.2559	.077
1. mm.	.0394	.012	2.7 mm.	.1063	.032	15	.1800	.054	F	.2570	.077
60	.0400	.012	36	.1065	.032	4.6 mm.	.1811	.054	6.6 mm.	.2598	.078
59	.0410	.012	7/64	.1093	.033	14	.1820	.055	G	.2610	.078
58	.0420	.013	35	.1100	.033	13	.1850	.056	6.7 mm.	.2638	.079
57	.0430	.013	2.8 mm.	.1102	.033	4.7 mm.	.1850	.056	17/64	.2656	.080
1.1 mm.	.0433	.013	34	.1110	.033	3/16	.1875	.056	H	.2660	.080
56	.0465	.014	33	.1130	.034	4.8 mm.	.1890	.057	6.8 mm.	.2677	.080
3/64	.0469	.014	2.9 mm.	.1142	.034	12	.1890	.057	6.9 mm.	.2716	.082
1.2 mm.	.0472	.014	32	.1160	.035	11	.1910	.057	I	.2720	.082
1.3 mm.	.0512	.015	3. mm.	.1181	.035	4.9 mm.	.1929	.058	7. mm.	.2756	.083
55	.0520	.016	31	.1200	.036	10	.1935	.058	J	.2770	.083
54	.0550	.017	3.1 mm.	.1220	.037	9	.1960	.059	7.1 mm.	.2795	.084
1.4 mm.	.0551	.017	1/8	.1250	.037	5. mm.	.1968	.059	K	.2811	.084
1.5 mm.	.0591	.018	3.2 mm.	.1260	.038	8	.1990	.060	9/32	.2812	.084
53	.0595	.018	30	.1285	.039	5.1 mm.	.2008	.060	7.2 mm.	.2835	.085
1/16	.0625	.019	3.3 mm.	.1299	.039	7	.2010	.060	7.3 mm.	.2874	.086
1.6 mm.	.0629	.019	3.4 mm.	.1339	.040	13/64	.2031	.061	L	.2900	.087
52	.0635	.019	29	.1360	.041	6	.2040	.061	7.4 mm.	.2913	.087

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Drills listed are not necessarily all carried as stock sizes by drill manufacturers.

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TABLE No. 14—Continued

Decimal Sizes of Drills and Length of Drill Points

DIMENSIONS IN INCHES

Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point
M	.2950	.089	Y	.4040	.121	25/32	.7812	.235	1-11/64	1.1719	.352
7.5 mm.	.2953	.089	13/32	.4062	.122	20. mm.	.7874	.236	30. mm.	1.1811	.355
19/64	.2968	.089	Z	.4130	.124	51/64	.7969	.239	1-3/16	1.1875	.357
7.6 mm.	.2992	.090	10.5 mm.	.4134	.124	20.5 mm.	.8071	.242	30.5 mm.	1.2008	.361
N	.3020	.091	27/64	.4219	.127	13/16	.8125	.244	1-13/64	1.2031	.362
7.7 mm.	.3031	.091	11. mm.	.4330	.130	21. mm.	.8268	.248	1-7/32	1.2187	.366
7.8 mm.	.3071	.092	7/16	.4375	.131	53/64	.8281	.249	31. mm.	1.2205	.367
7.9 mm.	.3110	.093	11.5 mm.	.4528	.136	27/32	.8437	.253	1-15/64	1.2344	.371
5/16	.3125	.094	29/64	.4531	.136	21.5 mm.	.8465	.254	31.5 mm.	1.2402	.373
8. mm.	.3150	.095	15/32	.4687	.141	55/64	.8594	.258	1-1/4	1.2500	.376
O	.3160	.095	12. mm.	.4724	.142	22. mm.	.8661	.260	32. mm.	1.2599	.378
8.1 mm.	.3189	.096	31/64	.4843	.145	7/8	.8750	.263	1-17/64	1.2656	.380
8.2 mm.	.3228	.097	12.5 mm.	.4921	.148	22.5 mm.	.8858	.266	32.5 mm.	1.2795	.384
P	.3230	.097	1/2	.5000	.150	57/64	.8906	.268	1-9/32	1.2812	.385
8.3 mm.	.3268	.098	13. mm.	.5118	.154	23. mm.	.9055	.272	1-19/64	1.2969	.390
21/64	.3281	.098	33/64	.5156	.155	29/32	.9062	.272	33. mm.	1.2992	.390
8.4 mm.	.3307	.099	17/32	.5312	.160	59/64	.9219	.277	1-5/16	1.3125	.394
Q	.3320	.099	13.5 mm.	.5315	.160	23.5 mm.	.9252	.278	33.5 mm.	1.3189	.396
8.5 mm.	.3346	.101	35/64	.5469	.164	15/16	.9375	.282	1-21/64	1.3281	.399
8.6 mm.	.3386	.102	14. mm.	.5512	.166	24. mm.	.9449	.284	34. mm.	1.3386	.402
R	.3390	.102	9/16	.5625	.169	61/64	.9531	.286	1-11/32	1.3437	.404
8.7 mm.	.3425	.103	14.5 mm.	.5709	.172	24.5 mm.	.9646	.290	34.5 mm.	1.3583	.408
11/32	.3437	.103	37/64	.5781	.174	31/32	.9687	.291	1-23/64	1.3594	.408
8.8 mm.	.3465	.104	15. mm.	.5906	.177	25. mm.	.9843	.296	1-3/8	1.3750	.413
S	.3480	.104	19/32	.5937	.178	63/64	.9844	.296	35. mm.	1.3780	.414
8.9 mm.	.3504	.105	39/64	.6094	.183	1"	1.0000	.300	1-25/64	1.3906	.418
9. mm.	.3543	.105	15.5 mm.	.6102	.183	25.5 mm.	1.0040	.302	35.5 mm.	1.3977	.420
T	.3580	.108	5/8	.6250	.188	1-1/64	1.0156	.305	1-13/32	1.4062	.422
9.1 mm.	.3583	.108	16. mm.	.6299	.189	26. mm.	1.0236	.307	36. mm.	1.4173	.426
23/64	.3594	.108	41/64	.6406	.193	1-1/32	1.0312	.310	1-27/64	1.4219	.427
9.2 mm.	.3622	.109	16.5 mm.	.6496	.195	26.5 mm.	1.0433	.313	36.5 mm.	1.4370	.432
9.3 mm.	.3661	.110	21/32	.6562	.197	1-3/64	1.0469	.314	1-7/16	1.4375	.432
U	.3680	.111	17. mm.	.6693	.201	1-1/16	1.0625	.319	1-29/64	1.4531	.437
9.4 mm.	.3701	.111	43/64	.6719	.202	27. mm.	1.0630	.319	37. mm.	1.4567	.438
9.5 mm.	.3740	.112	11/16	.6875	.206	1-5/64	1.0781	.324	1-15/32	1.4687	.441
3/8	.3750	.113	17.5 mm.	.6890	.207	27.5 mm.	1.0827	.325	37.5 mm.	1.4764	.442
V	.3770	.113	45/64	.7031	.211	1-3/32	1.0937	.329	1-31/64	1.4844	.446
9.6 mm.	.3780	.114	18. mm.	.7087	.213	28. mm.	1.1024	.331	38. mm.	1.4961	.449
9.7 mm.	.3819	.115	23/32	.7187	.216	1-7/64	1.1094	.333	1-1/2	1.5000	.451
9.8 mm.	.3858	.116	18.5 mm.	.7283	.219	28.5 mm.	1.1220	.337	1-33/64	1.5156	.455
W	.3860	.116	47/64	.7344	.221	1-1/8	1.1250	.338	38.5 mm.	1.5158	.455
9.9 mm.	.3898	.117	19. mm.	.7480	.225	1-9/64	1.1406	.343	1-17/32	1.5312	.460
25/64	.3906	.117	3/4	.7500	.225	29. mm.	1.1417	.343	39. mm.	1.5354	.461
10. mm.	.3937	.118	49/64	.7656	.230	1-5/32	1.1562	.347	1-35/64	1.5469	.465
X	.3970	.119	19.5 mm.	.7677	.231	29.5 mm.	1.1614	.349	39.5 mm.	1.5551	.467

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Drills listed are not necessarily all carried as stock sizes by drill manufacturers.

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TABLE No. 14—Concluded

Decimal Sizes of Drills and Length of Drill Points

DIMENSIONS IN INCHES

Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point	Drill	Diam.	Length of Point
1-9/16	1.5625	.469	1-61/64	1.9531	.587	2-11/32	2.3437	.704	69.5 mm.	2.7362	.822
40. mm.	1.5748	.473	50. mm.	1.9685	.591	2-23/64	2.3594	.709	2-3/4	2.7500	.826
1-37/64	1.5781	.474	1-31/32	1.9687	.591	60. mm.	2.3622	.710	70. mm.	2.7559	.828
1-19/32	1.5937	.479	1-63/64	1.9844	.596	2-3/8	2.3750	.713	2-49/64	2.7656	.831
40.5 mm.	1.5945	.479	50.5 mm.	1.9882	.597	60.5 mm.	2.3819	.715	70.5 mm.	2.7756	.834
1-39/64	1.6094	.483	2"	2.0000	.601	2-25/64	2.3906	.718	2-25/32	2.7812	.836
41. mm.	1.6142	.485	51. mm.	2.0079	.603	61. mm.	2.4016	.721	71. mm.	2.7953	.840
1-5/8	1.6250	.488	2-1/64	2.0156	.605	2-13/32	2.4062	.723	2-51/64	2.7969	.840
41.5 mm.	1.6339	.491	51.5 mm.	2.0276	.609	61.5 mm.	2.4213	.727	2-13/16	2.8125	.845
1-41/64	1.6406	.493	2-1/32	2.0312	.610	2-27/64	2.4219	.728	71.5 mm.	2.8150	.846
42. mm.	1.6536	.497	2-3/64	2.0469	.615	2-7/16	2.4375	.732	2-53/64	2.8281	.849
1-21/32	1.6562	.497	52. mm.	2.0473	.615	62. mm.	2.4409	.733	72. mm.	2.8346	.851
1-43/64	1.6719	.502	2-1/16	2.0625	.619	2-29/64	2.4531	.737	2-27/32	2.8437	.854
42.5 mm.	1.6732	.503	52.5 mm.	2.0669	.621	62.5 mm.	2.4606	.739	72.5 mm.	2.8543	.857
1-11/16	1.6875	.507	2-5/64	2.0781	.624	2-15/32	2.4687	.741	2-55/64	2.8594	.859
43. mm.	1.6929	.509	53. mm.	2.0867	.627	63. mm.	2.4803	.745	73. mm.	2.8740	.863
1-45/64	1.7031	.512	2-3/32	2.0937	.629	2-31/64	2.4844	.746	2-7/8	2.8750	.864
43.5 mm.	1.7126	.514	53.5 mm.	2.1063	.632	63.5 mm.	2.5000	.751	2-57/64	2.8906	.868
1-23/32	1.7187	.516	2-7/64	2.1094	.633	2-1/2	2.5000	.751	73.5 mm.	2.8937	.869
44. mm.	1.7323	.520	2-1/8	2.1250	.638	2-33/64	2.5156	.756	2-29/32	2.9062	.873
1-47/64	1.7344	.521	54. mm.	2.1260	.639	64. mm.	2.5197	.757	74. mm.	2.9134	.875
1-3/4	1.7500	.526	2-9/64	2.1406	.643	2-17/32	2.5312	.760	2-59/64	2.9219	.878
44.5 mm.	1.7520	.526	54.5 mm.	2.1457	.644	64.5 mm.	2.5394	.763	74.5 mm.	2.9331	.881
1-49/64	1.7656	.530	2-5/32	2.1562	.648	2-35/64	2.5469	.765	2-15/16	2.9375	.882
45. mm.	1.7717	.532	55. mm.	2.1654	.650	65. mm.	2.5590	.769	75. mm.	2.9527	.887
1-25/32	1.7812	.535	2-11/64	2.1719	.652	2-9/16	2.5625	.770	2-61/64	2.9531	.887
45.5 mm.	1.7914	.538	55.5 mm.	2.1850	.656	2-37/64	2.5781	.774	2-31/32	2.9687	.892
1-51/64	1.7969	.540	2-3/16	2.1875	.657	65.5 mm.	2.5787	.774	75.5 mm.	2.9724	.893
46. mm.	1.8110	.544	2-13/64	2.2031	.662	2-19/32	2.5937	.779	2-63/64	2.9844	.897
1-13/16	1.8125	.544	56. mm.	2.2047	.662	66. mm.	2.5984	.781	76. mm.	2.9921	.899
1-53/64	1.8281	.549	2-7/32	2.2187	.666	2-39/64	2.6093	.784	3"	3.0000	.901
46.5 mm.	1.8307	.550	56.5 mm.	2.2244	.668	66.5 mm.	2.6181	.786	3-1/32	3.0312	.911
1-27/32	1.8437	.554	2-15/64	2.2344	.671	2-5/8	2.6250	.788	3-1/16	3.0625	.920
47. mm.	1.8504	.556	57. mm.	2.2441	.674	67. mm.	2.6378	.792	3-3/32	3.0937	.929
1-55/64	1.8594	.558	2-1/4	2.2500	.676	2-41/64	2.6406	.793	3-1/8	3.1250	.939
47.5 mm.	1.8701	.562	57.5 mm.	2.2638	.680	2-21/32	2.6562	.798	3-5/32	3.1562	.948
1-7/8	1.8750	.563	2-17/64	2.2656	.681	67.5 mm.	2.6575	.798	3-3/16	3.1875	.958
48. mm.	1.8898	.568	2-9/32	2.2812	.685	2-43/64	2.6719	.803	3-7/32	3.2187	.967
1-57/64	1.8906	.568	58. mm.	2.2835	.686	68. mm.	2.6772	.804	3-1/4	3.2500	.976
1-29/32	1.9062	.573	2-19/64	2.2969	.690	2-11/16	2.6875	.807	3-9/32	3.2812	.986
48.5 mm.	1.9095	.574	58.5 mm.	2.3031	.692	68.5 mm.	2.6968	.810	3-5/16	3.3125	.995
1-59/64	1.9219	.577	2-5/16	2.3125	.695	2-45/64	2.7031	.812	3-11/32	3.3437	1.004
49. mm.	1.9291	.579	59. mm.	2.3228	.698	69. mm.	2.7165	.816	3-3/8	3.3750	1.014
1-15/16	1.9375	.582	2-21/64	2.3281	.699	2-23/32	2.7187	.817	3-7/16	3.4375	1.033
49.5 mm.	1.9488	.585	59.5 mm.	2.3425	.704	2-47/64	2.7344	.821	3-1/2	3.5000	1.051

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Drills listed are not necessarily all carried as stock sizes by drill manufacturers.



TABLE No. 15

Recommended Lead Holes for 24S-T4 Wood Screws

DIMENSIONS IN INCHES

Screw Size	Body Diameter	Root Diameter	Threads Per Inch	Recommended Lead Hole Size					
				Spruce (Soft)		Yellow Oak (Medium Hard)		Birch (Hard) Maple (Very Hard)	
				70% Hole Size		75% Hole Size		80% Hole Size	
				Drill No.	Diam.	Drill No.	Diam.	Drill No.	Diam.
3	.099	.076	24	51	.067	49	.073	47	.0785
4	.112	.088	22	48	.076	45	.082	43	.089
5	.125	.097	20	44	.086	42	.0935	39	.0995
6	.138	.105	18	41	.096	37	.104	35	.10110
7	.151	.118	16	37	.104	34	.111	31	.120
8	.164	.123	15	33	.113	31	.120	30	.1285
9	.177	.132	14	1/8	.125	29	.136	28	.1405
10	.190	.143	13	29	.136	28	.1405	24	.152
12	.216	.167	11	24	.152	20	.161	17	.173
14	.242	.174	10	18	.1695	15	.180	10	.1935
16	.268	.189	9	12	.189	7	.201	3	.213

1. Lead hole should be drilled for full length of screw.
2. These recommended hole sizes will be found satisfactory for most uses. However, in special applications some slight deviation in hole size as determined by trial may be preferred. In some cases lead holes may be eliminated in soft woods, providing the thickness of section is sufficient to eliminate any danger of the wood splitting.
3. In some applications driving will be facilitated and a tighter fastening will result if a clearance hole is drilled to accommodate the unthreaded portion of the screw shank. This need not require an additional drilling operation if a double diameter step drill is used when drilling the lead hole.



TABLE No. 16

Recommended Hole Sizes for 24S-T4 Sheet Metal Screws

IN ALLOYS 2S, 3S, 52S (ALL TEMPER) AND 61S-T4

DIMENSIONS IN INCHES

TYPE A—GIMLET POINT

Screw Size	Metal Thickness	Pierced Hole	Drilled or Clean Punched Hole	Drill No.	Screw Size	Metal Thickness	Pierced Hole	Drilled or Clean Punched Hole	Drill No.
4	.016	.088	.073	49	8	.016	.120	.098	40
	.020	.088	.073	49		.020	.120	.098	40
	.025	.088	.073	49		.025	.120	.098	40
	.032	.098	.076	48		.032	.120	.104	37
6						.040	.136*	.110	35
	.016	.098	.082	45	10	.016	.120	.101	38
	.020	.098	.082	45		.020	.120	.101	38
	.025	.098	.082	45		.025	.120	.101	38
	.032	.098	.089	43		.032	.136	.106	36
7						.040	.136*	.113	33
	.016	.111	.093	42	12	.025	.157	.128	30
	.020	.111	.093	42		.032	.157	.136	29
	.025	.111	.093	42		.040	.185*	.144	27
	.032	.111	.093	40	14	.032	.185	.152	24
	.040	.120*	.106	36		.040	.185*	.166	19

Pierced holes in 52S and 61S not recommended for thicknesses above .032" with Type A screws.

TYPE Z—BLUNT POINT (Also Known as Type B)

Screw Size	Metal Thickness	Pierced Hole	Drilled or Clean Punched Hole	Drill No.	Screw Size	Metal Thickness	Pierced Hole	Drilled or Clean Punched Hole	Drill No.
4	.025	.086	....	..	8	.102	....	.147	26
	.032	.086	.086	44		.125	....	.147	26
	.040	.086	.086	44		.156	....	.149	25
	.051	.086	.086	44		.188	....	.152	24
	.064	....	.086	43	10	.025	.157	....	..
	.081	....	.089	43		.032	.157	....	..
	.102	....	.093	42		.040	.157	.144	27
6						.051	.157	.144	27
	.025	.111	....	..		.064	....	.144	27
	.032	.111	.104	37		.081	....	.147	26
	.040	.111	.104	37		.102	....	.147	26
	.051	.111	.104	37		.125	....	.154	23
	.064	....	.106	36		.156	....	.159	21
	.081	....	.110	35		.188	....	.166	19
	.102	....	.110	35	12	.051	....	.161	20
7						.064	....	.166	19
	.025	.120	....	..		.081	....	.173	17
	.032	.120	.113	33		.102	....	.180	15
	.040	.120	.113	33		.125	....	.182	14
	.051	.120	.116	32		.156	....	.189	12
	.064	....	.120	31		.188	....	.189	12
	.081	....	.128	30		.250	....	.196	9
	.102	....	.136	29	14	.064	....	.199	8
8	.125	....	.136	29		.081	....	.201	7
						.102	....	.204	6
	.025	.136	....	..		.125	....	.209	4
	.032	.136	.116	32		.156	....	.213	3
	.040	.136	.120	31		.188	....	.213	3
	.051	.136	.128	30		.250	....	.228	1

Hole sizes listed will be found suitable for most uses. However, in special applications some slight deviation in hole size as determined by trial may be preferred.



TABLE No. 17

Recommended Hole Sizes for Aluminum Alloy Rivets with Corresponding Shear and Bearing Areas

		Cold Driven Rivets										
Nominal Rivet Diameter, Inch		1/8	5/32	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4
Recommended Hole Diameter, Inch		0.1285	0.159	0.191	0.257	0.323	0.386	0.453	0.516	0.578	0.641	0.766
Corresponding Drill Size		30	21	11	F	P	W	29/64	33/64	37/64	41/64	49/64
Corresponding Single Shear Area, Sq. In.		0.01296	0.01986	0.02865	0.05187	0.08194	0.1170	0.1612	0.2091	0.2624	0.3227	0.4608
Bearing Area, Sq. In., for Various Sheet and Plate Thicknesses	0.032	0.00411	0.00509									
	0.040	0.00514	0.00636	0.00764								
	0.051	0.00655	0.00811	0.00974	0.01311							
	0.064	0.00822	0.01018	0.01222	0.01645	0.0207						
	0.081	0.01041	0.01288	0.01547	0.02082	0.0262	0.0313					
	0.102	0.01311	0.01622	0.01948	0.02621	0.0329	0.0394	0.0462				
	1/8	0.01606	0.01988	0.02388	0.03213	0.0404	0.0483	0.0566	0.0645	0.0723	0.0801	0.0958
	5/32	.....	0.02480	0.02980	0.04016	0.0505	0.0603	0.0708	0.0806	0.0903	0.1002	0.1197
	3/16	.....	.....	0.03581	0.04819	0.0606	0.0724	0.0849	0.0968	0.1084	0.1202	0.1436
	7/32	.....	.....	0.04178	0.05622	0.0707	0.0844	0.0991	0.1129	0.1264	0.1402	0.1676
	1/4	.....	.....	.....	0.06425	0.0808	0.0965	0.1133	0.1290	0.1445	0.1603	0.1915
	5/16	.....	.....	.....	.....	0.1009	0.1206	0.1416	0.1613	0.1806	0.2003	0.2394
	3/8	.....	.....	.....	.....	.....	0.1448	0.1699	0.1935	0.2168	0.2404	0.2873
	7/16	.....	.....	.....	.....	.....	.....	0.1982	0.2258	0.2529	0.2804	0.3351
	1/2	.....	.....	.....	.....	.....	.....	.....	0.2580	0.2890	0.3205	0.3830
	9/16	.....	.....	.....	.....	.....	.....	.....	.....	0.3251	0.3606	0.4309
	5/8	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.4006	0.4788
	11/16	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.4407	0.5266
	3/4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.5745
	13/16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	7/8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE No. 18

Average Ultimate Shear Strengths of Driven Rivets

These values are for rivets driven with cone-point heads. Rivets driven with heads requiring more pressure may be expected to develop slightly higher strengths.

Rivet	Driving Procedure	Shear Strength, Lb. per square inch
2S	Cold, as-received	11,000
A17S-T	Cold, as-received	33,000
17S-T	Cold, as-received	39,000
17S-T	Cold, immediately after quenching	34,000*
24S-T	Cold, immediately after quenching	42,000*
53S-T61	Cold, as-received	23,000
53S-T	Cold, as-received	26,000
17S-T	Hot, 930° to 950° F.	33,000*
53S-W	Hot, 960° to 1050° F.	18,000*†
Steel	Hot, 1700° to 1900° F.	45,000

* Immediately after driving the shear strengths of these rivets is about 75% of the value shown. On standing at ordinary temperatures they age harden to develop their full strength, this action being completed in about four days for 17S-T and 24S-T rivets and in about two weeks for 53S-W rivets.

† This shear strength is for rivets driven at temperatures of 960° to 980° F. The shear strength increases about 1000 lb. per square inch for each increase of 12° F. in driving temperature. Thus, if the driving temperature range is carefully maintained at 1030° F. to 1050° F., an average shear strength of 24,000 lb. per square inch will be developed in the driven rivets.



TABLE No. 19

Comparison of Aluminum Alloys used in Fabricating Screw Machine Products

Alloy and Temper	Machinability	Tensile Strength Lb./Sq. In.	Capacity for Cold Forming	Electrical Conductivity	Corrosion Resistance
11S-T3	1	55,000	5	2	3
17S-T4	2	62,000	4	3	3
24S-T4	2	68,000	5	3	3
61S-T6	3	45,000	3	2	2
63S-T5	4	30,000	2	1	2
3S-H14	5	21,500	2	2	1
2S-H14	5	17,500	1	1	1

Comparison of Aluminum Alloys for Rivets and Special Upset Products

Alloy and Temper	Tensile Strength Lb./Sq. In.	Shear Strength Lb./Sq. In.	Capacity for Cold Forming	Electrical Conductivity	Corrosion Resistance
2S-F	17,500	11,000	1	1	1
17S-T4	62,000	38,000	4	3	3
A17S-T4	43,000	28,000	2	2	3
24S-T4	68,000	41,000	4	3	3
53S-T6	39,000	24,000	3	2	2
53S-T61	32,000	22,000	2	2	2
56S-H32	45,000	28,000	3	3	2
61S-T6	45,000	30,000	3	2	2

- Numbers indicate the relative standings only, of these alloys in respect to the properties listed and have no quantitative significance.
- Temperatures given for machining alloys are those in which these alloys are most readily machined. When greater workability is required, parts can often be annealed after machining; many such parts can be re-heat treated after cold forming.
- Temperatures given for cold heading alloys are those in which these products are usually sold. Where subsequent cold working is to be done parts can be shipped in the unheat treated condition and so worked before heat treatment. Parts may also be furnished in the annealed condition if required.
- For more detailed information on the mechanical properties of these and other alloys see table No. 20.



TABLE No. 20

Typical¹ Mechanical Properties of Wrought Aluminum Alloys²

Alloy and Temper	Tensile Strength, Lb./Sq. In.	Yield Strength (Offset = 0.2%), Lb./Sq. In.	Elongation, Per Cent in 2 In.		Brinell Hardness, 500-kg. Load 10-mm. Ball	Shearing Strength, Lb./Sq. In.	Endurance Limit ³ , Lb./Sq. In.
			Sheet Specimen (1/16 Inch Thick)	Round Specimen (1/2 Inch Diameter)			
EC-O ¹⁰	12,000	4,000	..	(⁹)	..	.....	.....
EC-H19 (H)*	27,000	24,000	..	(⁹)	..	.....	7,000
2S-O	13,000	5,000	35	45	23	9,500	5,000
2S-H12 (1/4H)*	15,500	14,000	12	25	28	10,000	6,000
2S-H14 (1/2H)*	17,500	16,000	9	20	32	11,000	7,000
2S-H16 (3/4H)*	20,000	18,000	6	17	38	12,000	8,500
2S-H18 (H)*	24,000	22,000	5	15	44	13,000	8,500
3S-O	16,000	6,000	30	40	28	11,000	7,000
3S-H12 (1/4H)*	19,000	17,000	10	20	35	12,000	8,000
3S-H14 (1/2H)*	21,500	19,000	8	16	40	14,000	9,000
3S-H16 (3/4H)*	25,000	22,000	5	14	47	15,000	9,500
3S-H18 (H)*	29,000	26,000	4	10	55	16,000	10,000
4S-O	26,000	10,000	20	25	45	16,000	14,000
4S-H32 (1/4H)*	31,000	22,000	10	17	52	17,000	14,500
4S-H34 (1/2H)*	34,000	27,000	9	12	63	18,000	15,000
4S-H36 (3/4H)*	37,000	31,000	5	9	70	20,000	15,500
4S-H38 (H)*	40,000	34,000	5	6	77	21,000	16,000
11S-T3 ¹	55,000	48,000	..	15	95	32,000	18,000
11S-T8	59,000	45,000	..	12	100	35,000	18,000
14S-O	27,000	14,000	..	18	45	18,000	13,000
14S-T4 (W)*	62,000	44,000	..	20	105	38,000	18,000
14S-T6 (T)*	70,000	60,000	..	13	135	42,000	18,000
Alclad 14S-O	25,000	10,000	21	..	..	18,000	.....
Alclad 14S-T3 (W)*	63,000 ⁵	40,000 ⁵	20	..	..	37,000	.....
Alclad 14S-T4 (W)*	61,000 ⁵	37,000 ⁵	22	..	..	37,000	.....
Alclad 14S-T6 (T)*	68,000 ⁵	60,000 ⁵	11	..	..	41,000	.....
17S-O	26,000	10,000	..	22	45	18,000	13,000
17S-T4 (T)*	62,000	40,000	..	22	105	38,000	18,000
A17S-T4 (T)*	43,000	24,000	..	27	70	28,000	13,500
18S-T61 (T)*	62,000	48,000	..	12	120	39,000	17,000
24S-O	27,000	11,000	19	22	47	18,000	13,000
24S-T3 (T)*	70,000	50,000	16	..	120	41,000	18,000
24S-T4 (T)*	68,000 ⁶	48,000 ⁶	20	19	120	41,000	18,000
24S-T36 (RT)*	73,000	57,000	13	..	130	42,000	18,000
Alclad 24S-O	26,000	11,000	19	..	..	18,000	.....
Alclad 24S-T3 (T)*	64,000 ⁷	44,000 ⁷	15	..	..	40,000	.....
Alclad 24S-T4 (T)*	64,000 ⁷	42,000 ⁷	19	..	..	40,000	.....
Alclad 24S-T36 (RT)*	67,000 ⁷	53,000 ⁷	11	..	..	41,000	.....
Alclad 24S-T81	65,000 ⁷	60,000 ⁷	6	..	..	.....	.....
Alclad 24S-T86	70,000 ⁷	66,000 ⁷	6	..	..	.....	.....
25S-T6 (T)*	58,000	37,000	..	19	110	35,000	18,000
32S-T6 (T)*	55,000	46,000	..	9	120	38,000	16,000
A51S-T6 (T)*	48,000	43,000	..	17	100	32,000	11,000

(Concluded on Next Page)



TABLE No. 20—Concluded

Typical¹ Mechanical Properties of Wrought Aluminum Alloys²

Alloy and Temper	Tensile Strength, Lb./Sq. In.	Yield Strength (Offset = 0.2%), Lb./Sq. In.	Elongation, Per Cent in 2 In.		Brinell Hardness, 500-kg. Load 10-mm. Ball	Shearing Strength, Lb./Sq. In.	Endurance Limit ³ , Lb./Sq. In.
			Sheet Specimen (1/16 Inch Thick)	Round Specimen (1/2 Inch Diameter)			
52S-O	27,000	12,000	25	30	45	18,000	17,000
52S-H32 (1/4H)*	34,000	27,000	12	18	62	20,000	17,500
52S-H34 (1/2H)*	37,000	31,000	10	14	67	21,000	18,000
52S-H36 (3/4H)*	39,000	34,000	8	10	74	23,000	18,500
52S-H38 (H)*	41,000	36,000	7	8	85	24,000	19,000
53S-O	16,000	7,000	..	35	26	11,000	8,000
53S-T4 (W)*	33,000	20,000	..	30	65	20,000	13,000
53S-T5	30,000	25,000	..	13	65	18,000	.....
53S-T6 (T)*	39,000	33,000	..	20	80	24,000	13,000
56S-O	42,000	22,000	..	35	..	26,000	20,000
56S-H18 (H)*	62,000	58,000	..	6	..	33,000	22,000
61S-O	18,000	8,000	22	30	30	12,500	9,000
61S-T4 (W)*	35,000	21,000	22	25	65	24,000	13,500
61S-T6 (T)*	45,000	40,000	12	17	95	30,000	13,500
63S-F (as extruded)	22,000	13,000	20	..	42	14,000	.....
63S-T5	30,000	25,000	12	..	65	18,000	.....
63S-T6	35,000	30,000	12	..	73	22,000	.....
75S-O	33,000	15,000	17	16	60	22,000	.....
75S-T6 ⁸ (T)*	82,000	72,000	11	11	150	49,000	21,000
Alclad 75S-O	32,000	14,000	17	..	..	22,000	.....
Alclad 75S-T6 (T)*	76,000	67,000	11	..	..	46,000	.....

* Former temper designations are given in parentheses for information.

¹ The values given in this table are, in general, weighted averages which have taken into account the small variations introduced by size, shape or method of manufacture. Although, as a result, they may not exactly describe any one specific product, they provide an entirely sound basis for comparing the several alloys and tempers, and selecting the most suitable one which is commercially available in the desired product. For guaranteed minimum values, consult Alcoa.

² The modulus of elasticity varies somewhat with the alloy and is about 2% higher in compression than in tension. For most calculations, a value of 10,300,000 psi can be used for all alloys, but the following values, which are averages of the tension and compression moduli, can be used if more exact results are desired:

2S, 3S, 4S, 53S, 61S and 63S.....	10,000,000 psi
11S, A51S and 52S.....	10,200,000 psi
25S and 75S.....	10,400,000 psi
17S.....	10,500,000 psi
14S and 24S.....	10,600,000 psi
18S.....	10,800,000 psi
32S.....	11,400,000 psi

The modulus of rigidity is approximately 3,900,000 psi and Poisson's ratio is about 1/3.

³ The endurance limits are based on 500,000,000 cycles of completely reversed stress using the R. R. Moore type of machine and specimen.

⁴ For sizes up to 1-1/2 inches. For larger sizes, the strengths will be somewhat lower.

⁵ Sheet less than 0.040 inch thick will have slightly lower strengths.

⁶ The strengths of extrusions more than about 3/4 inch thick will be 15 to 20% higher.

⁷ Sheet more than 0.063 inch thick will have strengths slightly higher than these values.

⁸ The values given are for sheet. Extrusions will have strengths about 8 to 10% higher.

⁹ This material is commonly used in wire sizes for which the elongation is measured in 10 inches. The typical elongation in 10 inches is about 23% for EC-O and 1.5% for EC-H19; the elongations for 1/2 inch diameter specimens are considerably higher.

¹⁰ Electrical conductor grade.



TABLE No. 21

Method of Manufacture and Commercial Tolerances for Aluminum Stock used in Fabricating Screw Machine Products

Material	Method of Manufacture	Size Range (Diameter or Distance Across Flats)	Tolerance Inch, Plus or Minus		
ROUND WIRE	Drawn	.0126 to .035	.0005		
		.036 to .064	.0010		
		.065 to .374	.0015		
	Centerless ground after drawing	0.125 to 0.374	.0005		
ROUND ROD	Cold finished	.375 to .500	.0015		
		.501 to 1.000	.002		
		1.001 to 1.500	.0025		
		1.501 to 3.000	.004		
	Rolled	1.501 to 2.000	.006		
		2.000 to 3.499	.008		
	Centerless ground after cold finishing	.375 to .625	.0005		
		.626 to 1.500	.001		
	Centerless ground after rolling	1.501 to 2.000	.0025		
	SQUARE AND HEXAGONAL BAR	Cold finished	0.065 to .500	0.002	
0.501 to 1.000			0.0025		
1.001 to 1.500			0.003		
1.501 to 2.000			0.005		
Rolled		2.001 to 4.000	0.020		
	Diameter— Inside or Outside	Mean Diameter ¹ or Pi-Tape Measurement 3S, 4S, 24S, 52S, 61S	Individual Measurement of Diameter (Out-of-Roundness) Except (1) Soft (0), or (2) Thin Wall Tubes ²		
			3S, 4S, 52S	24S, 61S	
ROUND TUBING	Drawn	0.125 to 0.500	0.003	0.003	0.006
		0.501 to 1.000	0.004	0.004	0.008
		1.01 to 2.00	0.005	0.005	0.010
		2.01 to 3.00	0.006	0.006	0.012
		3.01 to 5.00	0.008	0.008	0.016

¹ Mean diameter is the average of any two measurements of diameter taken at right angles to each other at any point along the length of the tube.

² Thin wall tubes, i.e. tubes having a wall thickness less than 2.5 per cent of the diameter or less than 0.020 inch, and tubes in the soft (0) temper shall be commercially round. The deviations of individual measurements from the nominal will vary with the alloy and the ratio of wall thickness to diameter.

TABLE No. 22

Decimal Equivalents of Common Gage Numbers used in Specifying Aluminum Products

Gage Number	Decimal Equivalent in Inches		
	AMERICAN SCREW GAGE	AMERICAN WIRE GAGE	BIRMINGHAM OR STUBS
	Used for machine, sheet metal, and wood screws	(Brown & Sharpe Gage) Used for sheet	Used for tubing
0000	.....	.46	.454
000	.....	.40964	.425
00	.....	.3648	.380
0	.....	.32486	.340
1	.....	.2893	.300
2	.086	.25763	.284
3	.099	.22942	.259
4	.112	.20431	.238
5	.125	.18194	.220
6	.138	.16202	.203
7	.151	.14428	.180
8	.164	.12849	.165
9	.177	.11443	.148
10	.190	.10189	.134
11	.203	.09074	.120
12	.216	.08081	.109
13	.229	.07196	.095
14	.242	.06408	.083
15	.255	.05707	.072
16	.268	.05082	.065
17	.281	.04526	.058
18	.294	.0403	.049
19	.....	.03589	.042
20	.320	.03196	.035
21	.....	.02846	.032
22	.346	.02535	.028
23	.....	.02257	.025
24	.372	.0201	.022
25	.....	.0179	.02
26	.398	.01594	.018
27	.....	.01419	.016
28	.424	.01264	.014
29	.....	.01126	.013
30	.450	.01002	.012
31	.....	.00893	.01
32	.....	.00795	.009
33	.....	.00708	.008
34	.....	.0063	.007
35	.....	.00561	.005
36	.....	.005	.004

TABLE No. 23

Conversion Table—Gross to Pieces

Gross	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Pieces	144	288	432	576	720	864	1008	1152	1296	1440	1584	1728	1872	2016	2160	2304	2448	2592	2736	2880
Gross	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Pieces	3024	3168	3312	3456	3600	3744	3888	4032	4176	4320	4464	4608	4752	4896	5040	5184	5328	5472	5616	5760
Gross	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Pieces	5904	6048	6192	6336	6480	6624	6768	6912	7056	7200	7344	7488	7632	7776	7920	8064	8208	8352	8496	8640
Gross	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Pieces	8784	8928	9072	9216	9360	9504	9648	9792	9936	10080	10224	10368	10512	10656	10800	10944	11088	11232	11376	11520
Gross	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Pieces	11664	11808	11952	12096	12240	12384	12528	12672	12816	12960	13104	12348	13392	13536	13680	13824	13968	14112	14256	14400
Gross	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Pieces	14544	14688	14832	14976	15120	15264	15408	15552	15696	15840	15984	16128	16272	16416	16560	16704	16848	16992	17136	17280
Gross	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Pieces	17424	17568	17712	17856	18000	18144	18288	18432	18576	18720	18864	19008	19152	19296	19440	19584	19724	19872	20016	20160
Gross	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Pieces	20304	20448	20592	20736	20880	21024	21168	21312	21456	21600	21744	21888	22032	22176	22320	22464	22608	22752	22896	23040
Gross	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Pieces	23184	23328	23472	23616	23760	23904	24048	24192	24336	24480	24624	24768	24912	25056	25200	25344	25488	25632	25776	25920
Gross	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Pieces	26064	26208	26352	26496	26640	26784	26928	27072	27216	27360	27504	27648	27792	27936	28080	28224	28368	28512	28656	28800
Gross	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300
Pieces	29520	30240	30960	31680	32400	33120	33840	34560	35280	36000	36720	37440	38160	38880	39600	40320	41040	41760	42480	43200
Gross	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400
Pieces	43920	44640	45360	46080	46800	47520	48240	48960	49680	50400	51120	51840	52560	53280	54000	54720	55440	56160	56880	57600
Gross	410	420	430	440	450	460	470	480	490	500										
Pieces	59040	60480	61920	63360	64800	66240	67680	69120	70560	72000										



TABLE No. 24
Decimal Equivalents

DIMENSIONS IN INCHES

1/64.....015625	33/64.....515625
1/32.....03125	17/32.....53125
3/64.....046875	35/64.....546875
1/16.....0625	9/16.....5625
5/64.....078125	37/64.....578125
3/32.....09375	19/32.....59375
7/64.....109375	39/64.....609375
1/8.....125	5/8.....625
9/64.....140625	41/64.....640625
5/32.....15625	21/32.....65625
11/64.....171875	43/64.....671875
3/16.....1875	11/16.....6875
13/64.....203125	45/64.....703125
7/32.....21875	23/32.....71875
15/64.....234375	47/64.....734375
1/4.....25	3/4.....75
17/64.....265625	49/64.....765625
9/32.....28125	25/32.....78125
19/64.....296875	51/64.....796875
5/16.....3125	13/16.....8125
21/64.....328125	53/64.....828125
11/32.....34375	27/32.....84375
23/64.....359375	55/64.....859375
3/8.....375	7/8.....875
25/64.....390625	57/64.....890625
13/32.....40625	29/32.....90625
27/64.....421875	59/64.....921875
7/16.....4375	15/16.....9375
29/64.....453125	61/64.....953125
15/32.....46875	31/32.....96875
31/64.....484375	63/64.....984375
1/2.....5	1.....1.

CONDITIONS OF SALE AND MANUFACTURING PRACTICES

NO. 1—TERMS: F. O. B. shipping point. (Edgewater, N. J.).

NO. 2—QUOTATIONS: Stenographical and clerical errors subject to correction. Until an order is accepted by Seller, quoted prices are subject to change without notice. All quotations unless otherwise stated are for immediate acceptance. Unless called for by customer's specifications, prices quoted do not include burring. All orders and contracts subject to acceptance at Seller's home office.

NO. 3—CREDIT: Accounts will be opened only with firms or individuals on approved credit, cash required in advance from all others. The Seller reserves the privilege of declining to make deliveries except for cash whenever, for any reason, doubt as to the Buyer's responsibility develops.

NO. 4—CANCELLATION: Orders may be cancelled or deliveries deferred only upon the Seller's consent and upon terms that will indemnify him against all loss.

NO. 5—QUANTITIES: All quotations are based on Buyer accepting over-run or under-run on each individual item not exceeding 10% of quantities ordered, to be paid for or allowed pro rata. Where closer control of quantity is required special arrangements must be made.

NO. 6—DELIVERIES: Every effort will be made to fill orders within the time promised. The Seller does not assume responsibility for any damages growing out of or owing to any delays whatever. Unless specifically stated to the contrary, quotations are made and orders are accepted for delivery as fast as manufactured by partial shipment packed in bulk.

NO. 7—SAMPLES: If requested, the Seller will submit samples for approval when commencing operations upon any order, but does so with the understanding that his machines are to be run immediately after they are set correctly to Buyer's accepted specifications, and Seller will assume responsibility for having the product in conformity with such specifications during the period necessary in which to obtain Buyer's approval. Any change in specifications

can be made only at Buyer's direction and expense. If changes are to be made Seller should be notified at once by telephone or wire followed by written confirmation.

NO. 8—CLAIMS: If any material furnished by Seller proves defective, or not as ordered, he must be notified within ten days from receipt of shipment and shall have the option in such an event of taking back the goods and deciding whether he shall replace them or not, but under no circumstances will he allow or be liable for damages, or any claim for expense involved in using his product. Claims for shortage must be made within ten days from receipt of the goods, and in every case the weights found in the shipment must be given and also the method used in arriving at a count of the parts.

NO. 9—TOLERANCES: All dimensions must be limited by a specified tolerance. When not specified it is understood that commercial tolerances apply: viz.,

Decimal Dimensions:

Diameters up to and including 1" plus or minus .002".

Above 1" plus or minus .003".

Lengths plus or minus .010".

Fractional Dimensions:

Diameters plus or minus .005".

Lengths plus or minus .010".

Drilled hole tolerances will be open unless otherwise specified by Buyer.

Samples to be considered as fractional dimensions, unless otherwise specified and dimensions of samples will be considered "mean" dimensions. Where there are cross drilling, milling and similar operations shown on prints, the location will be without relation to other dimensions unless otherwise specified.

When Buyer purchases pursuant to his own specifications, the Seller will not be responsible for the design and fitting of parts; the conforming of the Seller's product to the specified tolerances is sufficient evidence as to the correctness of the product.

It is definitely understood that concentricity is not a dimension and when specified must be specified separately from dimension and will be subject to inspection only at the point where the

relation is shown on the blueprint. When concentricity limitation is specified it is understood that it means the actual eccentricity allowable between the center lines of the dimensions, which is one half of a dial reading registration. When concentricity is not specified the work will be manufactured in the most economical manner without particular regard to concentricity, and quotations are made and orders accepted on this basis.

NO. 10—THREADS: Unless otherwise specified, threads will be of American National form and in accordance with Class 2 fit as specified in the latest National Bureau of Standards Handbook, H-28, "SCREW THREAD STANDARDS FOR FEDERAL SERVICES." When the Buyer specifies threads other than those listed in table No. 9 or 10, tools and gages are to be furnished by Buyer or charged for by Seller.

External Threads: Where threading to the shoulder is specified, if a relief or undercut of sufficient width is not provided for, it will be understood that the last full thread will not be cut closer to the shoulder than a distance of two and one-half threads and in the case of fine pitches, never closer than $1/16"$.

Internal Threads: Unless dimensional limits for minor diameter of tapped holes are specified, the percent of full depth thread will be in accordance with regularly accepted general practice. Unless otherwise specified, blind tapped holes may not have a full thread closer than five threads from the bottom and in case of fine pitches, not closer than $5/32"$.

NO. 11—GAGES: Where tolerances are closer than commercial limits defined under No. 9—Tolerances or when dimensions cannot be readily gaged with micrometers, such gages may be furnished by Buyer or supplied by Seller at an extra charge. In the case of threads the inspection gages shall conform to the limits specified by the latest National Bureau of Standards Handbook, H-28, "SCREW THREAD STANDARDS FOR FEDERAL SERVICES" for inspection gages.

NO. 12—INSPECTION: Inspection by the Seller is made on a percentage basis only. If

100% inspection is required it is at Buyer's expense, and only such parts proved not as ordered by Buyer's inspection may be returned with a claim for repair, credit, or replacement, as covered by No. 8—Claims and No. 5—Quantities.

NO. 13—DIES, TOOLS, ETC.: Charges for dies, tools or gages do not convey ownership or the right to remove them from Seller's factory. Seller is not responsible for drawings, samples, models, or gages uncalled for within 30 days after execution of any order or quotation.

NO. 14—SHIPMENT: In ordering, the Buyer should state explicitly the method of shipment preferred and in the absence of shipping directions the Seller will use discretion, forwarding by express or parcel post when packages are small and therefore liable to be lost in transit by freight. Parcel post shipments will be insured at Buyer's expense unless otherwise specified. The seller assumes no responsibility for the placing of valuations on shipments unless specifically requested to do so by the Buyer.

NO. 15—BUYER'S MATERIAL: Quotations covering machining of Buyer's material are made subject to delivery of the amount of material as specified by the Seller in 10 to 12 ft. lengths, F. O. B. Seller's plant, and are subject to change if material furnished by the Buyer is defective or will not machine with reasonable wear on tools at the speed and feed estimated. The Seller does not guarantee to deliver more than 90% of the quantity order, in accordance with No. 5—Quantities.

NO. 16—PATENTS: It is not the intention of the Seller to manufacture any product which is an infringement of a patented article. Parts are made by the Seller strictly to dimensional specifications furnished by the Buyer. It is agreed that the Buyer will defend and save harmless the Seller from any and all expense involved in any claims for damages from infringements of letters patent by the use or sale of parts made by the Seller, either as such or as parts of units of complete entities. Buyer does not assume responsibility for parts made on equipment violating licenses.

SECTION

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ALCOA DISTRIBUTORS

ATLANTA 3, GEORGIA

*J. M. Tull Metal & Supply Company,
Inc.
285 Marietta St., N. W.
Phone: WALnut 3525

BALTIMORE 17, MARYLAND

Whitehead Metal Products Co., Inc.
413 West North Avenue
Phone: LAfayette 2300

BOSTON, MASSACHUSETTS

Whitehead Metal Products Co., Inc.
281 Albany Street
Cambridge 39, Massachusetts
Phone: TRowbridge 6-4680

BUFFALO 7, NEW YORK

Brace-Mueller-Huntley, Inc.
1807 Elmwood Avenue
Phone: RIverside 2620

BUFFALO 2, NEW YORK

Whitehead Metal Products Co., Inc.
254 Court Street
Phone: CLeveland 1475

CHARLOTTE 5, NORTH CAROLINA

Edgcomb Steel Company
527 Atando Avenue
Phone: 4-9768

CHICAGO 80, ILLINOIS

*Central Steel & Wire Company
3000 West 51st Street
Phone: REpublic 7-3000

CHICAGO 23, ILLINOIS

*Steel Sales Corporation
3348 S. Pulaski Road
Phone: BIshop 7-7700

CINCINNATI 29, OHIO

Williams & Company, Inc.
3231 Fredonia Ave.
Phone: CApital 3000

CLEVELAND 14, OHIO

Williams & Company, Inc.
3700 Perkins Avenue
Phone: UTah 1-5000

*Home Office

COLUMBUS 12, OHIO

Williams & Company, Inc.
851 Williams Avenue
Phone: KLondike 1623

DALLAS 9, TEXAS

Metal Goods Corporation
6211 Cedar Springs Road
Phone: DIxon 4-3925

DETROIT 10, MICHIGAN

Steel Sales Corporation
5151 Wesson Avenue
Phone: TYler 6-3000

HOUSTON 1, TEXAS

Metal Goods Corporation
711 Milby Street
P. O. Box 1452
Phone: Beacon 3-8881

KANSAS CITY, NORTH, 16, MO.

Metal Goods Corporation
1300 Burlington (No. Kansas City)
Phone: NORclay 3516

LOS ANGELES 54, CALIFORNIA

*Ducommun Metals & Supply Co.
4890 South Alameda Street
Phone: KLImball 0161

LOS ANGELES 21, CALIFORNIA

Pacific Metals Company, Ltd.
1400 So. Alameda Street
Phone: PRospect 0171

NEWARK 5, NEW JERSEY

Whitehead Metal Products Co., Inc.
205 Frelinghuysen Avenue
Phone: BIgelow 8-8500

NEW ORLEANS 12, LOUISIANA

Metal Goods Corporation
432 Julia Street
Phone: CAAnal 7373

NEW YORK 14, NEW YORK

*Whitehead Metal Products Co., Inc.
303 West Tenth Street
Phone: WAtkins 4-1500

PHILADELPHIA 34, PENNSYLVANIA

*Edgcomb Steel Company
D Street, below Erie Avenue
Phone: GAfield 3-6300

PHILADELPHIA 40, PENNSYLVANIA

Whitehead Metal Products Co., Inc.
1955 Hunting Park Avenue
Phone: BAldwin 9-2323

PITTSBURGH 12, PENNSYLVANIA

*Williams & Company, Inc.
901 Pennsylvania Avenue
Phone: CEdar 1-8600

PORTLAND 9, OREGON

*Pacific Metal Company
303 N. W. Park Avenue
Phone: BRoadway 0695

ROCHESTER 1, NEW YORK

Brace-Mueller-Huntley, Inc.
315 Hollenbeck Street
Phone: GLenwood 0962

ST. LOUIS 15, MISSOURI

*Metal Goods Corporation
5239 Brown Avenue
Phone: GOodfellow 1234

SAN FRANCISCO 10, CALIFORNIA

*Pacific Metals Company, Ltd.
3100 19th Street
Phone: MIssion 7-1104
East Bay: Enterprise 10806

SEATTLE 4, WASHINGTON

Pacific Metal Company
4150 First Avenue, South
Phone: MAIn 6925

SYRACUSE 1, NEW YORK

*Brace-Mueller-Huntley, Inc.
Thompson Road
Phones: 73-3341 and 9-6621

SYRACUSE 3, NEW YORK

Whitehead Metal Products Co., Inc.
201 Burt Street
Phone: SYracuse 5-4112

TOLEDO 2, OHIO

Williams & Company, Inc.
650 E. Woodruff Avenue
Phone: ADams 8101

TULSA 3, OKLAHOMA

Metal Goods Corporation
302 North Boston
Phone: 4-1175

Sales Offices of Aluminum Company of America are listed on next page



ALCOA SALES OFFICES

AKRON 8, OHIO.....	506 Akron Savings & Loan Building
ALBANY 7, N. Y.....	90 State Street
ALLENTOWN, PA.....	913 Hamilton Street
ATLANTA 3, GA.....	1800 Rhodes-Haverty Building
BALTIMORE 1, MD.....	400 Baltimore Life Building
BIRMINGHAM 3, ALA.....	505 First National Building
BOSTON 16, MASS.....	20 Providence Street, Park Square
BUFFALO 7, N. Y.....	1880 Elmwood Avenue
CHARLOTTE 2, N. C.....	815 Johnston Building
CHICAGO 11, ILL.....	520 North Michigan Avenue
CINCINNATI 2, OHIO.....	801 Enquirer Building
CLEVELAND 13, OHIO.....	1450 Terminal Tower
COLUMBUS 15, OHIO.....	526 Rowlands Building
DALLAS 1, TEXAS.....	301 Thomas Building
DAVENPORT, IOWA.....	503 Kahl Building
DAYTON 2, OHIO.....	302 Harries Building
DENVER, COLO.....	316 Chamber of Commerce Building
DETROIT 2, MICH.....	610 New Center Building
FAIRFIELD, CONN.....	1333 Post Road
FORT WAYNE, INDIANA.....	1935 Lincoln Tower
GRAND RAPIDS 2, MICH.....	812 Michigan National Bank Building
HARTFORD 3, CONN.....	Capitol Building, 410 Asylum Street
HOUSTON 2, TEXAS.....	1806 Commerce Building
INDIANAPOLIS 4, IND.....	817 Merchants Bank Building
JACKSON, MICH.....	1203 National Bank Building
KANSAS CITY 6, MO.....	2300 Power & Light Building
LOS ANGELES 14, CALIF.....	108 West Sixth Street
LOUISVILLE 2, KY.....	1154 Starks Building
MIAMI 32, FLA.....	1129 Alfred I. du Pont Building
MILWAUKEE 2, WIS.....	735 North Water Street
MINNEAPOLIS 2, MINN.....	1060 Northwestern Bank Building
NEWARK 2, N. J.....	744 Broad Street
NEW ORLEANS 12, LA.....	627 Whitney Bank Building
NEW YORK 17, N. Y.....	230 Park Avenue
OKLAHOMA CITY 2, OKLA.....	1606 Apco Tower
PEORIA 1, ILL.....	415 Commercial National Bank Building
PHILADELPHIA 9, PA.....	123 S. Broad Street
PITTSBURGH 22, PA.....	2012 Oliver Building
PONTIAC 15, MICH.....	301 Pontiac State Bank Building
PORTLAND 4, ORE.....	510 The United States National Bank Building
PROVIDENCE 3, R. I.....	815 Industrial Trust Building
RICHMOND 19, VA.....	213 Exchange Building
ROCHESTER 4, N. Y.....	1331 Lincoln Alliance Bank Building
ST. LOUIS 8, MO.....	10th Floor, Continental Building
SAN FRANCISCO 4, CALIF.....	615 Russ Building
SEATTLE 1, WASH.....	1411 Fourth Avenue Building
SOUTH BEND 5, IND.....	805 J.M.S. Building
SPRINGFIELD 3, MASS.....	507 Tarbell-Watters Building
SYRACUSE 2, N. Y.....	408 State Tower Building
TAMPA 2, FLA.....	1004 Tampa Theater Building
TOLEDO 4, OHIO.....	1801 Ohio Building
WASHINGTON 6, D. C.....	1200 Ring Building
WICHITA 2, KAN.....	411 Fourth National Bank Building
WILMINGTON 50, DEL.....	310 Pennsylvania Building
YORK, PA.....	203 Manufacturers Building



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ALUMINUM COMPANY OF AMERICA

GENERAL OFFICES, GULF BUILDING
PITTSBURGH 19, PA.

